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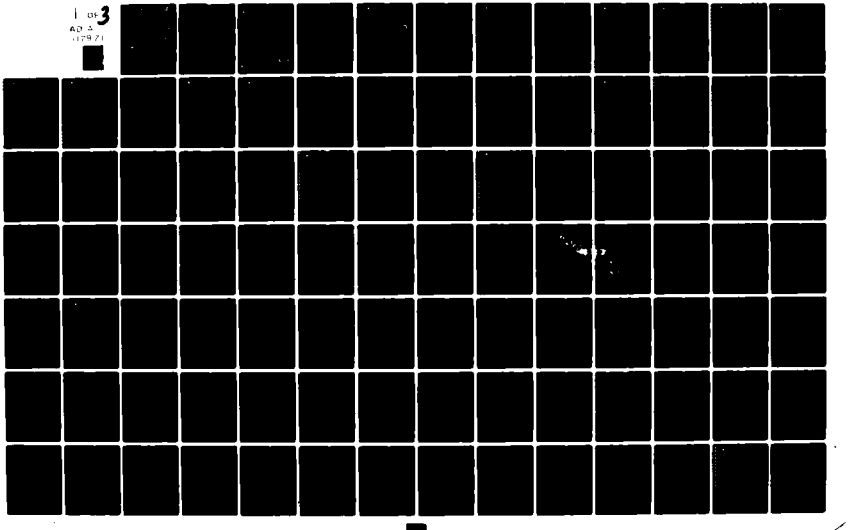

LEVEL II

AD-A117 971

INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

For
Tyndall Air Force Base, Florida

CH2M HILL

Prepared for

AIR FORCE ENGINEERING AND SERVICES CENTER
DIRECTORATE OF ENVIRONMENTAL PLANNING
TYNDALL AIR FORCE BASE, FLORIDA 32403

JUNE 1982

NOTICE

This report has been prepared for the United States Air Force by CH2M HILL SOUTHEAST, INC., for the purpose of aiding in the implementation of Air Force Solid Waste Management Programs. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, or the Department of Defense.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS TACTICAL AIR COMMAND
LANGLEY AIR FORCE BASE, VA 23665

REPLY TO ATTN OF DEEV

30 JUL 1982

SUBJECT Installation Restoration Program (IRP) Records Search, Tyndall AFB

TO See Distribution

1. We provided your office with copies of the subject report on or about 26 Jan 82. This study used a site rating model developed in Jun 1981 to identify the potential for contamination resulting from past disposal practices. On 26-27 Jan 82, representatives of USAF OEHL, AFESC, several major commands, Engineering Science, and CH2M Hill met at our office to develop an improved rating system. The new rating model, Hazardous Assesment Rating Methodology (HARM), is now used for all Air Force IRP studies. To maintain consistency, AFESC had their on-call contractors review their phase I studies performed before the advent of HARM and provide two additional appendices. The new appendices address the background of the HARM system and evaluate each of the phase I sites using the Jan 82 rating methodology.

2. Enclosed are copies of the added appendices for the Installation Restoration Program (IRP) Records Search at Tyndall AFB. Request you attach these appendices to the phase I reports we provided you in Jan 82.

3. For AFRCE-ER: Request you distribute copies of the new appendices to the Regional Environmental Protection Agency and Florida Department of Environmental Regulation.

4. For DTIC. Request you integrate the enclosed appendices with the Installation Restoration Program Records Search for Tyndall AFB into the National Technical Information System (NTIS). The report and new appendices are approved for public release with unlimited distribution.

5. Our project officer for IRP is Mr. Burnet, A/V 432-4430.

FOR THE COMMANDER

George C. Windrow

GEORGE C. WINDROW
Actg Dir of Eng & Env Plng

1 Atch
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INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

For

TYNDALL AIR FORCE BASE, FLORIDA

Prepared for

AIR FORCE ENGINEERING AND SERVICES CENTER
DIRECTORATE OF ENVIRONMENTAL PLANNING
TYNDALL AIR FORCE BASE, FLORIDA 32403

Supersedes AD-A110369

By

CH2M HILL
Gainesville, Florida

~~December 1981~~ June 1982

Contract No. F08637 80-G0010 0005

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FOREWORD

FOREWORD

The organization of the report is summarized below for the benefit of the reader:

Executive Summary

Section I--Introduction (background information, purpose and scope, decision-making methodology)

Section II--Installation Description (base conditions, history, and organization)

Section III--Environmental Setting (meteorology, geology, hydrology, and ecology)

Section IV--Findings (activities, disposal site descriptions and assessments)

Section V--Off-Base Installations (Carrabelle, St. George Island, Apalachicola, Springfield, Cove Gardens, Bay County Lagoon, Lynn Haven)

Section VI--Conclusions

Section VII--Recommendations

References--Includes a consolidated list of references

Appendixes--Includes attached Appendixes A through K (note that installation photographs taken during the helicopter overflight are located in Appendix K)

LIST OF ACRONYMS, ABBREVIATIONS,
AND SYMBOLS USED IN THE TEXT

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS USED IN THE TEXT

ACMI	Aircraft Control Maneuvering Instrumentation
AFB	Air Force Base
AFESC	Air Force Engineering and Services Center
AFFFs	Aqueous Film Forming Foams
AFRCE	Air Force Regional Civil Engineer
AGE	Aerospace Ground Equipment
AMMO	Ammunitions
AVGAS	Aviation Gasoline
BOD	Biochemical Oxygen Demand
CE	Civil Engineering
cm/sec	centimeters per second
COD	Chemical Oxygen Demand
DF	Diesel Fuel
DFSP	Defense Fuel Supply Point
DLA	Defense Logistics Agency
DOD	Department of Defense
DPDO	Defense Property Disposal Office
EOD	Explosive Ordnance Disposal
EP	Extraction Procedure
EPA	Environmental Protection Agency
°F	degrees Fahrenheit
ft	foot (feet)
ft/sec	feet per second
FTD	Field Training Detachment
FWW	Fighter Weapons Wing
gpd	gallons per day
gpm	gallons per minute
IRP	Installation Restoration Program
JP	Jet Petroleum
K	knots
MATTS	Multiple Air Target Trajectory System
MEK	Methyl ethyl ketone
mgd	million gallons per day
mg/l	milligrams per liter
MOGAS	Motor Gasoline

LIST OF ACRONYMS, ABBREVIATIONS,
AND SYMBOLS USED IN THE TEXT--Continued

NCO	Noncommissioned Officer
NDI	Non-Destructive Inspection
No.	Number
NPDES	National Pollutant Discharge Elimination System
OEHL	Occupational and Environmental Health Laboratory
PCBs	Polychlorinated biphenyls
PMEL	Precision Measurement Equipment Laboratory
POL	Petroleum, oil, and lubricants
RCRA	Resource Conservation and Recovery Act
SAGE	Semi-Automatic Ground Environment
TAC	Tactical Air Command
TCE	Trichloroethylene
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TTS	Technical Training Squadron
USAF	United States Air Force
USAFADWC	USAF Air Defense Weapons Center

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

A. Introduction

1. CH2M HILL was retained by the Air Force Engineering and Services Center (AFESC) using funding provided by the Tactical Air Command (TAC), on July 24, 1981 to conduct the Tyndall AFB records search under Contract No. F08637-80-G0010-0005.

2. Department of Defense policy was directed by Defense Environmental Quality Program Policy Memorandum 80-6 dated 24 June 1980 and implemented by Air Force message dated 2 December 1980 as a positive action to ensure compliance of military installations with the Resource Conservation and Recovery Act (RCRA) and implementing regulations. The purpose of DOD policy is to control the migration of hazardous material contaminants from DOD installations.

3. To implement the DOD policy, a three-phase Installation Restoration Program has been directed. Phase I, the records search, is the identification of potential problems. Phase II is the quantification of the problem and determination of corrective measures that may be required. The third phase is to contain, correct, and/or mitigate identified or potential environmental hazards that may result in hazardous contaminant migration from the installation.

4. The Tyndall AFB records search included a detailed review of pertinent installation records, contacts with 13 government agencies for documents relevant to the records search effort, and an onsite base

visit conducted by CH2M HILL during the week of September 14 through September 18, 1981. Activities conducted during the onsite base visit included interviews with 35 past and present base employees, ground tours of base facilities, and a helicopter overflight to identify past disposal areas. Installations addressed in the records search include Tyndall AFB, Carrabelle Missile Tracking Annex, St. George Island ACMI Tower, Apalachicola Radio Relay Annex, Springfield Railroad Siding Annex, Cove Gardens Military Family Housing Satellite, Bay County Wastewater Treatment Lagoon, and Lynn Haven Defense Fuels Supply Point (DFSP).

B. Major Findings

1. The major industrial operations at Tyndall AFB involving hazardous chemicals and wastes have been in existence since the 1960's, and include aircraft washing, stripping and painting; pneudraulics repair; engine and bearing cleaning; AGE maintenance; and the NDI lab activities. Since no large-scale industrial operations have been conducted at Tyndall AFB, the quantities of waste oils, solvents, paint residues, and thinners generated have been small. The standard procedure for disposition of waste oils and so nts has been to send the wastes to designated POL waste storage tanks.

2. Interviews with 35 past and present base employees resulted in the identification of 17 past disposal sites and the approximate dates that these sites were used. These sites include 7 landfills, 5 rubble and yard trash burial sites, and 5 other

sites used for EOD munitions burial, fuels storage, or fire training. In general, the landfills were used for disposal of municipal refuse, putrescible garbage, and construction demolition debris, although unauthorized disposal of drummed hazardous waste solvents and chemicals to base landfills was reported. These drummed wastes could have included small quantities of paint residues and thinners; waste solvents such as methyl ethyl ketone, aliphatic naphtha, trichloroethylene, cresylic acid, and o-dichlorobenzene; paint remover; waste oils; and concrete-encased asbestos.

3. The Lynn Haven DFSP was also identified as a site of potential contaminant migration. Moderate quantities of Bunker C fuel were reportedly disposed of at the site and are being recovered in a recently installed underdrain and oil/water separator system. Prior to 1969, it was common practice to bury sludges from leaded fuel in the vicinity of the fuel storage tanks.

C. Conclusions

1. No direct evidence indicates migration of hazardous contamination beyond Tyndall AFB properties.

2. Small quantities of hazardous wastes, primarily waste solvents, have been disposed of in landfills in the past.

3. A potential exists for migration of pollutants due to a high water table and moderately permeable soil conditions. The potential for migration beyond base property is low at most of the identified sites due to low hydraulic gradients, with the exception of Sites No. 6 and 7.

4. The following sites showed the most significant potential, relative to other sites, for contaminant migration:

   - Sites No. 6 and 7 shown on Figure 10, page IV-22, (Sewage Plant Vicinity Landfill and Spray Field Vicinity Landfill) due primarily to the proximity to St. Andrew Sound, evidence of leachate in a main drainage ditch which flows through these sites to St. Andrew Sound, location of a treated wastewater effluent spray irrigation site adjacent to and upgradient from Site No. 7, permeable soil conditions, high hydraulic gradient, and known small quantities of hazardous wastes.

   - Site No. 14 shown on Figure 10, page IV-22, (POL Area "A" Tank Farm) due primarily to the known past disposal of sludge from leaded AVGAS storage tanks, the site's location adjacent to Shoal Point Bayou, permeable soil conditions, and proximity to drinking water supply wells.

   - Lynn Haven DFSP, shown on Figure 1, page I-2, due primarily to its proximity to North Bay, permeable soil conditions, high water table, reported burial of leaded tank sludge, and reported disposal of moderate quantities of Bunker C fuel.

5. The remaining sites identified at Tyndall AFB and the auxiliary installations are not considered to pose a contaminant migration problem.

D. Recommendations

1. To verify that hazardous contaminant migration is not a problem at Sites 6, 7, and 14 and at Lynn Haven DFSP, a limited Phase II program is advisable. The recommended program includes the following:

   - Sites No. 6 and 7 (base landfills)--installation and sampling of 3 downgradient groundwater monitoring wells, collection of a water and a sediment sample from the drainage ditch, collection of a water sample from an existing spray field monitoring well, and analysis of water samples for pH, COD, TOC, oil and grease, phenol, volatile organic compounds (including trichloroethylene, o-dichlorobenzene, and methyl ethyl ketone), DDT, lead, chromium, nickel, cadmium, mercury, and iron.

   - Site No. 14 (POL Area "A")--excavation of one 20-foot-long backhoe pit north of the perimeter fence, inspection of the pit for soil characteristics and evidence of fuel saturation or stratification, collection of a water sample, and analysis of the sample for lead, COD, and oil and grease.

   - Lynn Haven DFSP--installation and sampling of four ground-water monitoring wells between the facility and North Bay and one monitoring well south of the facility, and analysis of water samples for lead, oil and grease, and COD.

2. Details of the program outlined above, including the exact location of sampling points, should be finalized as part of the IRP Phase II program. In the event that contaminants are detected during visual inspection of the test pit or in the water samples collected from any of the wells, a more extensive field survey program should be implemented to determine the extent of the contaminant migration. Since no imminent hazard has been determined, there is no immediate urgency to conduct the above program, which can be implemented as financial resources become available.

I. INTRODUCTION

I. INTRODUCTION

A. Background

The primary legislation governing the management and disposal of solid waste is the Resource Conservation and Recovery Act (RCRA) of 1976. Regulations and implementing instructions for the Act are continuing to be developed by EPA. Under RCRA Section 3012 (Public Law 96-482, October 21, 1981) each state is required to inventory all past and present hazardous waste disposal sites. Section 6003 of RCRA requires Federal agencies to assist EPA and make available all requested information on past disposal practices. It is the intent of the Department of Defense (DOD) to comply fully in these as well as other requirements of RCRA. Simultaneous to the passage of RCRA, the DOD devised a comprehensive Installation Restoration Program (IRP). The purpose of the IRP is to identify, report, and correct environmental deficiencies from past disposal practices that could result in ground-water contamination and probable migration of contaminants beyond DOD installation boundaries. In response to RCRA and in anticipation of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, the DOD issued Defense Environmental Quality Program Policy Memorandum 80-6 (DEQPPM 80-6) on 24 June 1980 which directed the implementation of the IRP program.

To conduct the Installation Restoration Program records search for Tyndall AFB, the AFESC retained CH2M HILL on July 24, 1981 under Contract No. F08637-80-G0010-0005. Funding for the project was provided by the Tactical Air Command. The installations included in the records search are Tyndall AFB and several offsite facilities which are supported by Tyndall AFB (Figure 1) as follows:

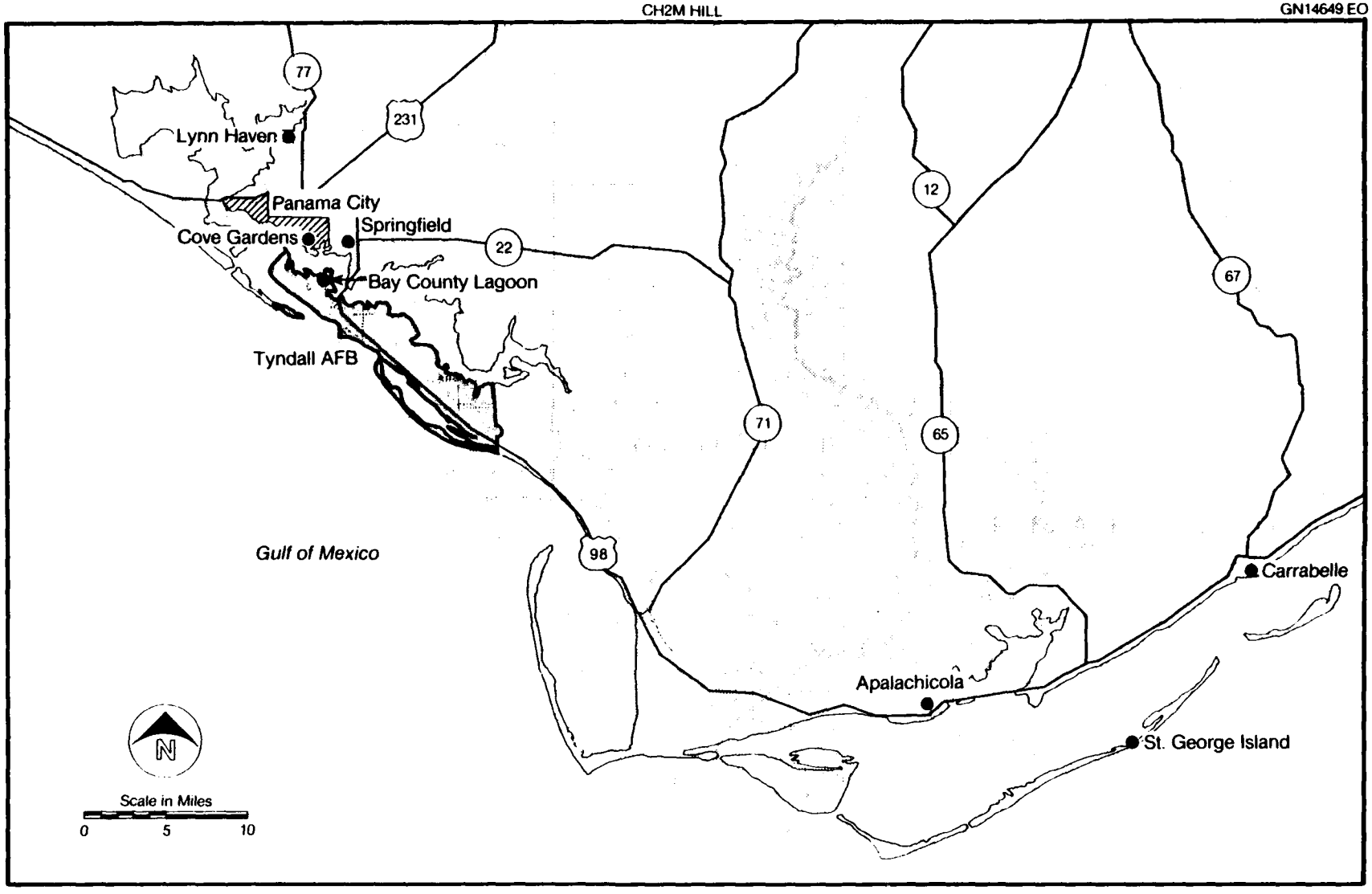

FIGURE 1. Location map of Tyndall AFB properties.

1. Lynn Haven Defense Fuel Supply Point

2. Carrabelle Missile Tracking Annex

3. Apalachicola Radio Relay Annex

4. St. George Island ACMI Tower

5. Springfield Railroad Siding Annex

6. Cove Gardens Military Family Housing Satellite

The Bay County Wastewater Treatment Lagoon is also included since it is located on Tyndall land which has been leased to Bay County.

The records search comprises Phase I of the Department of Defense (DOD) Installation Restoration Program and is intended to review installation records to identify possible hazardous waste contaminated sites and potential problems that may result in contaminant migration from the installation. Phase II is the quantification of the problem and determination of corrective measures that may be required. The third phase is to contain, correct, and/or mitigate identified potential environmental hazards.

B. Authority

The identification of hazardous waste disposal sites at military installations was directed by Defense Environmental Quality Program Policy Memorandum 80-6 (DEQPPM 80-6) dated 24 June 1980, and implemented by Air Force message dated 2 December 1980, as a positive action to ensure compliance with the Resource Conservation and Recovery Act (RCRA) and implementing regulations.

C. Purpose of the Records Search

DOD policy is to control the migration of hazardous material contaminants from DOD installations and to abate contaminant migration that may have an adverse impact on public health or the environment. This potential was evaluated at Tyndall AFB by reviewing the existing information and conducting a detailed analysis of installation records. Pertinent information involves the history of operations, the geological and hydrogeological conditions which may contribute to the migration of contaminants off the installation, and the ecological settings which indicate sensitive habitats or evidence of environmental stress resulting from contaminants.

D. Scope

The records search consisted of a pre-performance meeting, a preliminary coordination meeting, an onsite base visit, a review and analysis of the information obtained, and preparation of this report.

The pre-performance meeting was held at Tyndall AFB on August 4, 1981. Attendees at this meeting included representatives of AFESC, USAF OEHL, Tactical Air Command (TAC), Tyndall AFB, and CH2M HILL. The purpose of the pre-performance meeting was to provide detailed project instructions for the records search, to provide clarification and technical guidance by AFESC, and to define the responsibilities of all parties participating in the Tyndall AFB records search.

A CH2M HILL representative conducted a preliminary visit to Tyndall AFB on August 25, 1981 to become familiar with the installation and to effect coordination for the records search team onsite base visit.

The onsite base visit was conducted by CH2M HILL from September 14 through September 18, 1981. Activities performed during the onsite visit included a detailed search of installation records, ground and aerial tours of the installation, and interviews with former and present base personnel. At the conclusion of the onsite base visit, an outbriefing was held with the Commander of the 325th Combat Support Group and members of his staff to dicuss preliminary findings. The following individuals comprised the CH2M HILL records search team:

1. Mr. Norman Hatch, Project Manager (M.S. Chemistry, 1972; M.S. Environmental Engineering, 1973)

2. Mr. Bruce Haas, Assistant Project Manager (M.S. Civil Enginering, 1976)

3. Mr. Stephen Hahn, Hydrogeologist (M.S. Civil Engineering, 1973)

4. Dr. Robert Knight (M.S. Environmental Science, 1973; Ph.D. Environmental Engineering, 1980)

Resumes of these team members are included in Appendix A.

Thirteen government agencies were contacted for documents relevant to the records search effort. Appendix B lists the agencies contacted during the records search.

Individuals from the Air Force who assisted in the Tyndall AFB records search included the following:

1. Mr. Bernard Lindenberg, AFESC, Program Manager, Phase I

2. Mr. Gil Burnet, TAC, Command Representative, Phase I

3. Mr. Arturo McDonald, Tyndall AFB, Environmental Coordinator

4. Major Gary Fishburn, USAF OEHL, Program Manager, Phase II

E. Methodology

The methodology utilized in the Tyndall AFB records search is shown graphically on Figure 2. First, a review of past and present industrial operations is conducted at the base. Information is obtained from available records such as shop files and real property files, as well as interviews with past and present base employees from the various operating areas of the base. A list of interviewees from Tyndall AFB (total of 35 interviewees), including areas of knowledge and years of employment, is given in Appendix C.

The next step in the activity review process is to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various industrial operations on the base. Included in this part of the activities review is the identification of all past landfill sites and burial sites; as well as any other possible sources of contamination such as major PCB or solvent spills, or fuel-saturated areas resulting from large fuel spills or leaks.

A helicopter overflight and a general ground tour of identified sites are then made by the records search team to gather site-specific information including evidence of environmental stress and the presence of nearby drainage ditches or surface-water bodies to visually inspect these water bodies for any obvious signs of contamination or leachate migration.

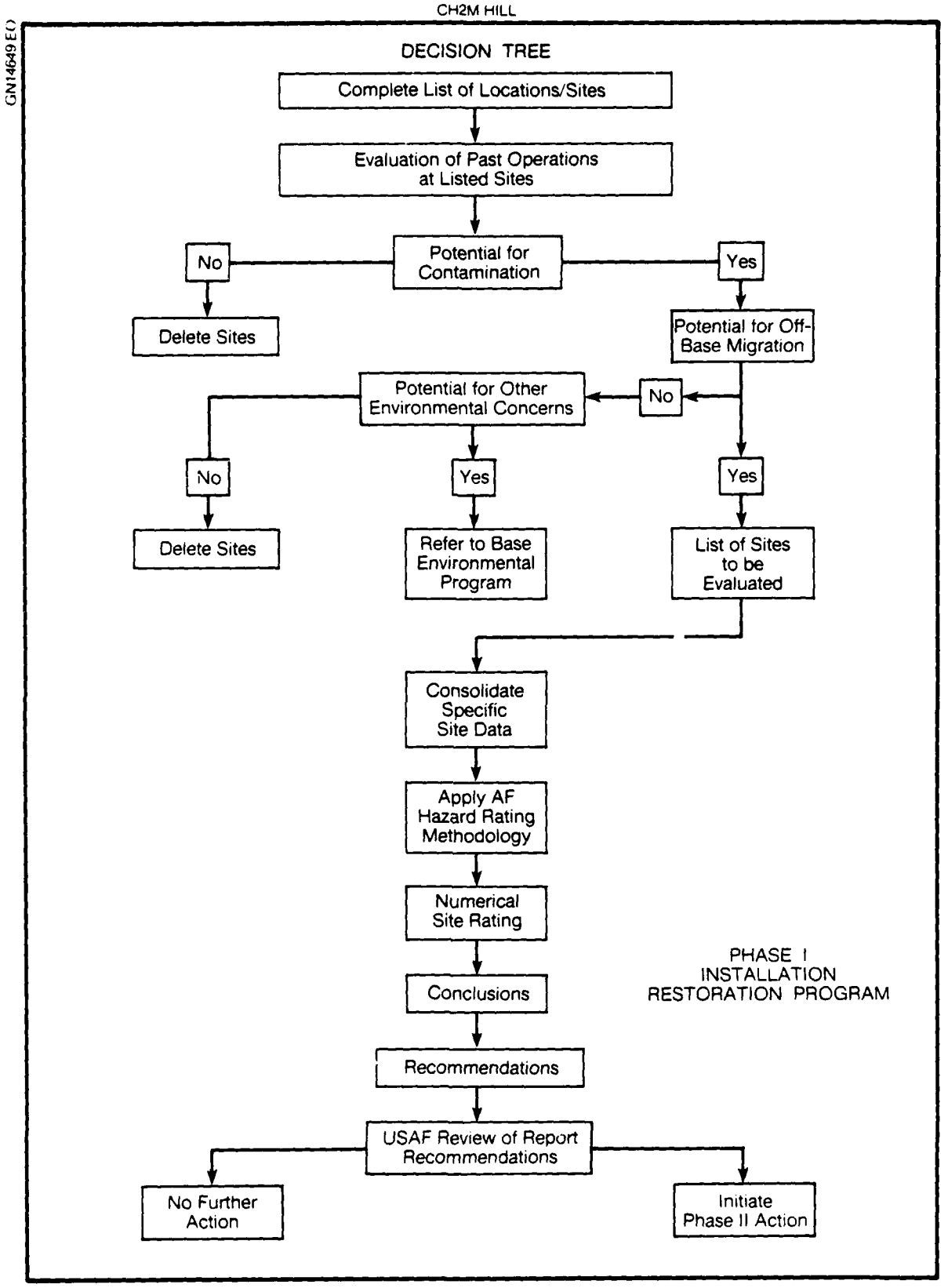

FIGURE 2. Records Search Methodology.

A decision is then made, based on all of the above information, whether a potential exists for hazardous material contamination in any of the identified sites. If not, the site is deleted from further consideration. If minor operations and maintenance deficiencies are noted during the investigations, the condition is reported to the Base Environmental Coordinator for remedial action.

For those sites where a potential for contamination is identified, a determination of the potential for migration of the contamination off the installation boundaries is made by considering site-specific soil and ground-water conditions. If there is potential for on-base contaminant migration or other environmental concerns, the site is referred to the base environmental monitoring program for further action. If no further environmental concerns are identified, the site is deleted from consideration. If the potential for off-base contaminant migration is considered significant, then the site is rated and prioritized using the site rating methodology described in Appendix I, "Site Hazard Evaluation Methodology."

The site rating indicates the relative potential for contaminant migration at each site. For those sites showing a high potential, recommendations are made to quantify the potential contaminant migration problem under Phase II of the Installation Restoration Program. For those sites showing a medium potential, a limited Phase II program may be advisable to confirm that a contaminant migration problem does not exist. For those sites showing a low potential, no Phase II work would be recommended.

II. INSTALLATION DESCRIPTION

II. INSTALLATION DESCRIPTION

A. Location

Tyndall AFB is located in Bay County, Florida, about 12 miles southeast of Panama City as shown on Figure 3. The base is situated on a narrow peninsula that extends about 18 miles along the Gulf of Mexico from the resort community of Mexico Beach southeast of the base to the main shipping channel in St. Andrew Bay. It is bordered by the Gulf of Mexico and St. Andrew Sound to the southwest, St. Andrew Bay to the north and west, and East Bay to the northeast.

The installation covers approximately 28,000 acres. In addition, Tyndall AFB supports facilities off the base, including sites at Lynn Haven, Cove Gardens, Springfield, Apalachicola, St. George Island, and Carrabelle. These installations, shown on Figure 1, page I-2, are discussed in Section V.

B. Organization and Mission

Tyndall AFB was activated in 1941 at the outset of World War II and became the center of the Army Air Corps' first flexible gunnery school. The Base was later transferred to the Air Training Command (1950), to the Air Defense Command (1957), and finally to Tactical Air Command in 1979. A more detailed description of Base history is included in Appendix D.

The current host unit at Tyndall AFB is the USAF Air Defense Weapons Center (USAFADWC), whose primary mission is the training of air defense crews, and the testing of new weapons systems and air defense tactics. Tyndall AFB's largest tenant unit is the U.S. Air Force Engineering and Services Center (AFESC), which functions as a principal technical support center for civil engineering and environmental quality research, development, testing, and evaluation.

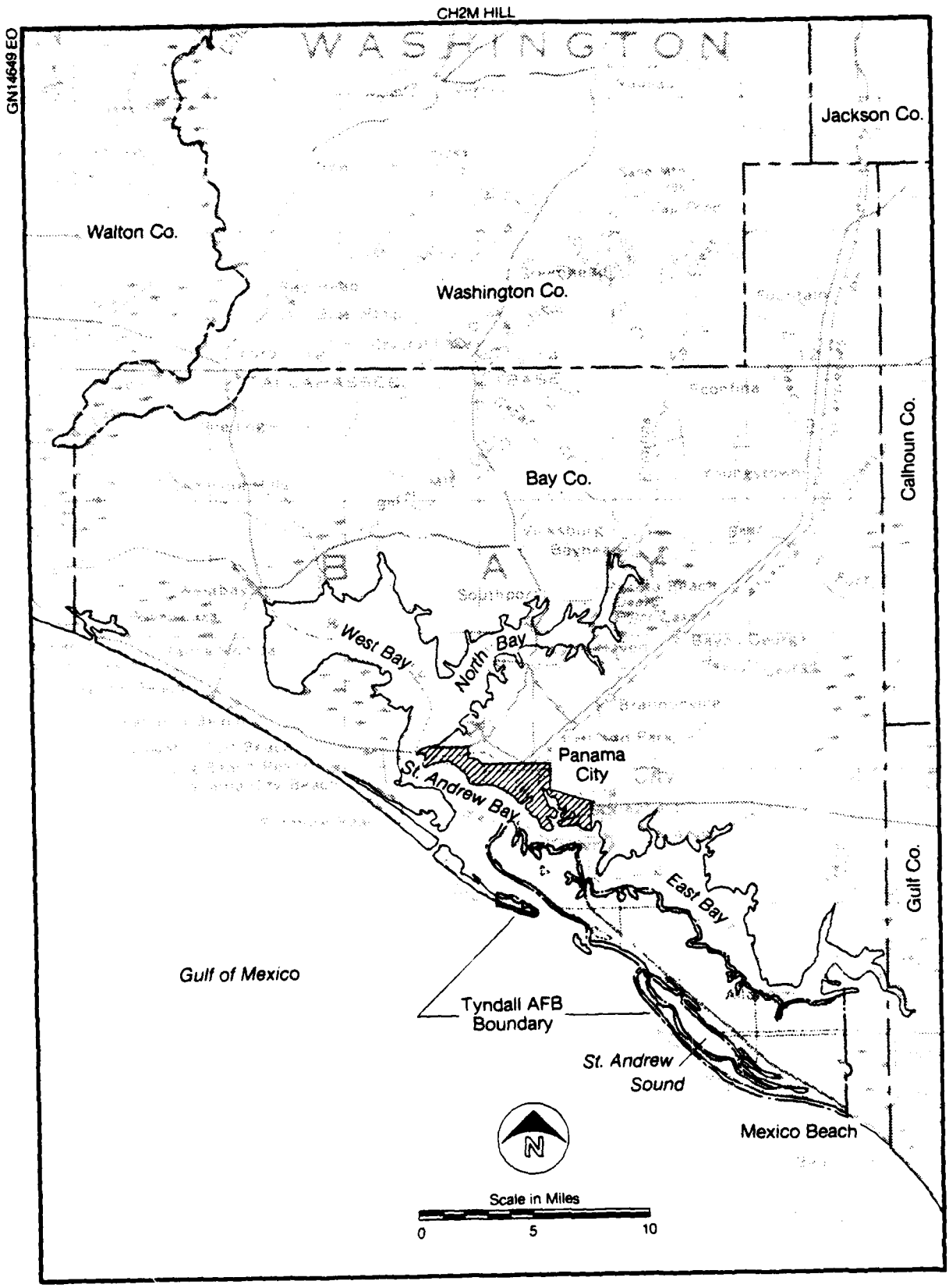

FIGURE 3. Location map of Tyndall AFB and contiguous surface-water bodies.

III. ENVIRONMENTAL SETTING

III. ENVIRONMENTAL SETTING

A. Meteorology

Located near 30° north latitude, Tyndall AFB is within a belt of high pressure known as the "horse latitudes." The climate of this region shares aspects of the northern temperate latitudes and the southern semi-tropical latitudes. The warm, humid semi-tropical conditions are prevalent for approximately half of the year with convective storms and hurricanes playing a dominant role in weather patterns. During the winter season, occasional cold fronts break through from the temperate latitudes, bringing winter rains and occasional freezing temperatures.

The annual average temperature at Tyndall AFB is 69°F with an average daily maximum and minimum of 77° and 61°F, respectively (see Table 1). The Gulf of Mexico, with an average annual water temperature of 73°F, has a stabilizing effect on the climate of the base and contributes to the high relative humidity, which averages 75 percent.

Tyndall AFB has an average annual rainfall of 55.2 inches, with 125 days of recordable precipitation during the year. Greatest rainfall occurs between June and September with other, smaller peaks in December and in March. Most thunderstorm activity occurs during the months of June, July, and August. Lake evaporation is about 50 inches per year and is an approximation of the evapotranspiration in the area. Actual evapotranspiration rates over land areas may be greater or less than this value depending on vegetative cover type.

Surface wind speeds are generally weak, with highest average winds (12 knots) in March and lowest values during the summer months (7 knots). Peak winds as high as 69 knots

Table 1
METEROLOGICAL DATA SUMMARY FOR TYNDALL AFB

Parameter	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Temperature (°F)													
Average Maximum	63	65	69	76	83	87	89	89	87	80	71	64	77
Average Minimum	46	49	54	61	68	74	76	75	72	63	53	47	61
Mean	55	57	62	69	76	81	83	82	79	71	62	56	69
Sea Temperature (°F)													
Mean	62	62	64	70	76	80	82	84	82	76	72	66	73
Precipitation (inches)													
Mean	3.56	3.47	5.26	4.34	2.43	4.94	8.14	7.07	6.13	3.05	3.16	3.64	55.19
Relative Humidity (%)													
Mean	76	75	74	74	75	76	77	77	76	71	72	74	75
Surface Winds (K)													
Prevailing	8	11	12	10	8	7	8	7	7	8	8	8	-
Peak	47	52	46	55	42	60	56	68	69	40	43	42	-

Source: Base Weather Office, 1948-1980.

have been recorded at the Tyndall AFB flightline. The beaches were buffeted by winds up to 100 knots during the passage of hurricane Eloise in 1975.

B. Geology

Tyndall AFB is located on a peninsula that extends along the shoreline of the Gulf of Mexico. The highest ground on the peninsula is 20 to 30 feet above mean sea level and occurs along a ridge located approximately 3,000 feet north of the St. Andrew Sound shoreline. U.S. Highway 98 runs along the crest of this ridge.

In general, areas on the northeast side of the ridge belong to the "flatwoods forest" physiographic subdivision. The ground surface in this area is nearly flat and covered with pine trees. Surficial soils are sandy yet poorly drained. Close to the bay, there are some low-lying areas that are frequently inundated by heavy rains.

Areas on the southwest side of the coastal ridge belong to the "beach dunes and wave-cut bluffs" physiographic subdivision. Surface features prevalent within this subdivision include estuaries, lagoons, spits, barrier islands, and sand dunes. Crooked Island, a sand spit which separates St. Andrew Sound from the Gulf of Mexico is characteristic of this subdivision. The approximate limits of the physiographic subdivisions in the area of Tyndall AFB are shown on Figure 4.

Typical soil and rock formations underlying the peninsula are illustrated on Figure 5. Sands and clayey sands of Pliocene to Recent age (10 million years ago to present) extend to a depth of approximately 110 feet. These soils are moderately permeable, and transmit water readily. Occasional clayey sand and hardpan layers occur at varying depths within the formation and impede the downward movement

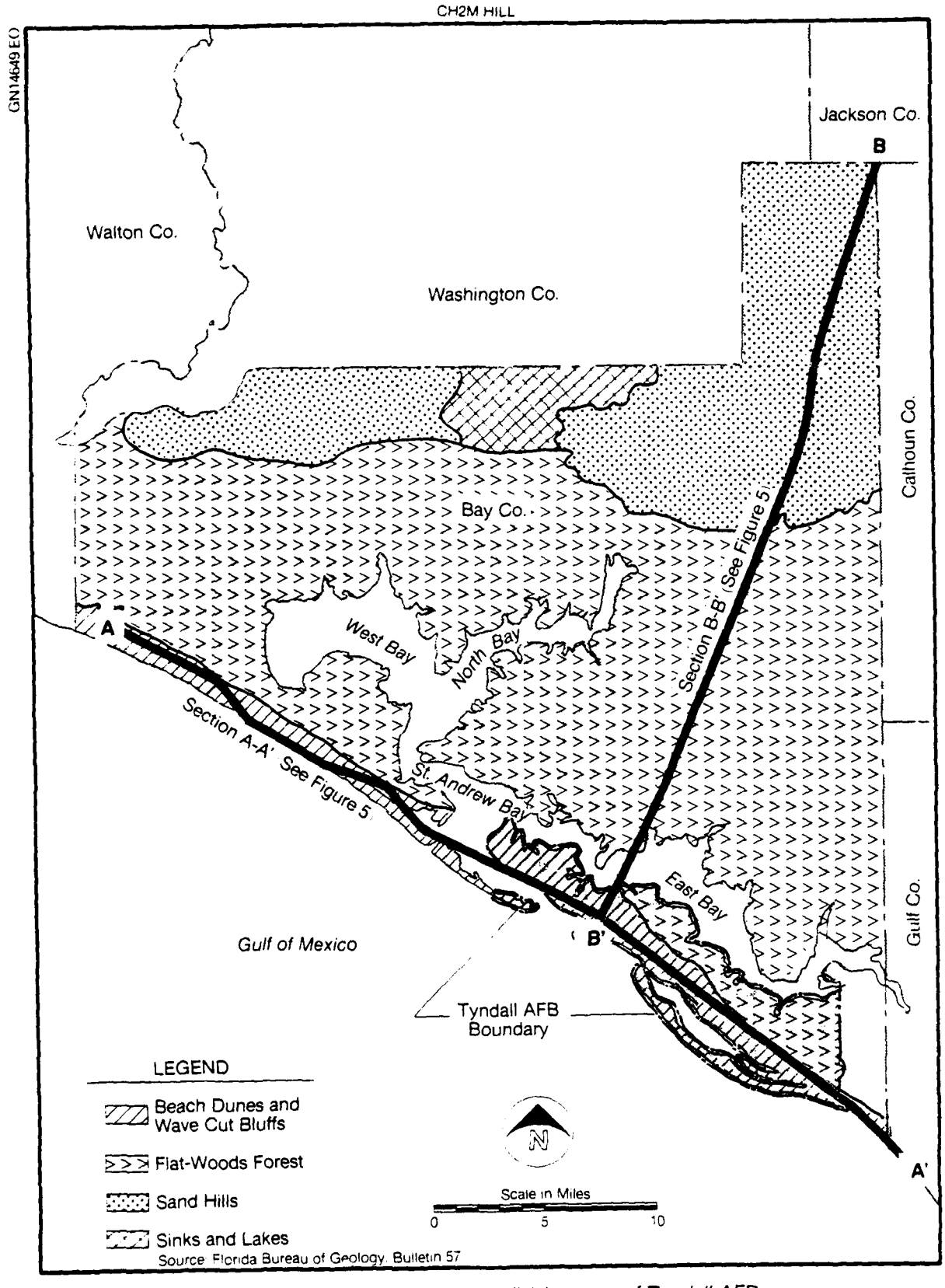

FIGURE 4. Physiographic subdivision map of Tyndall AFB.

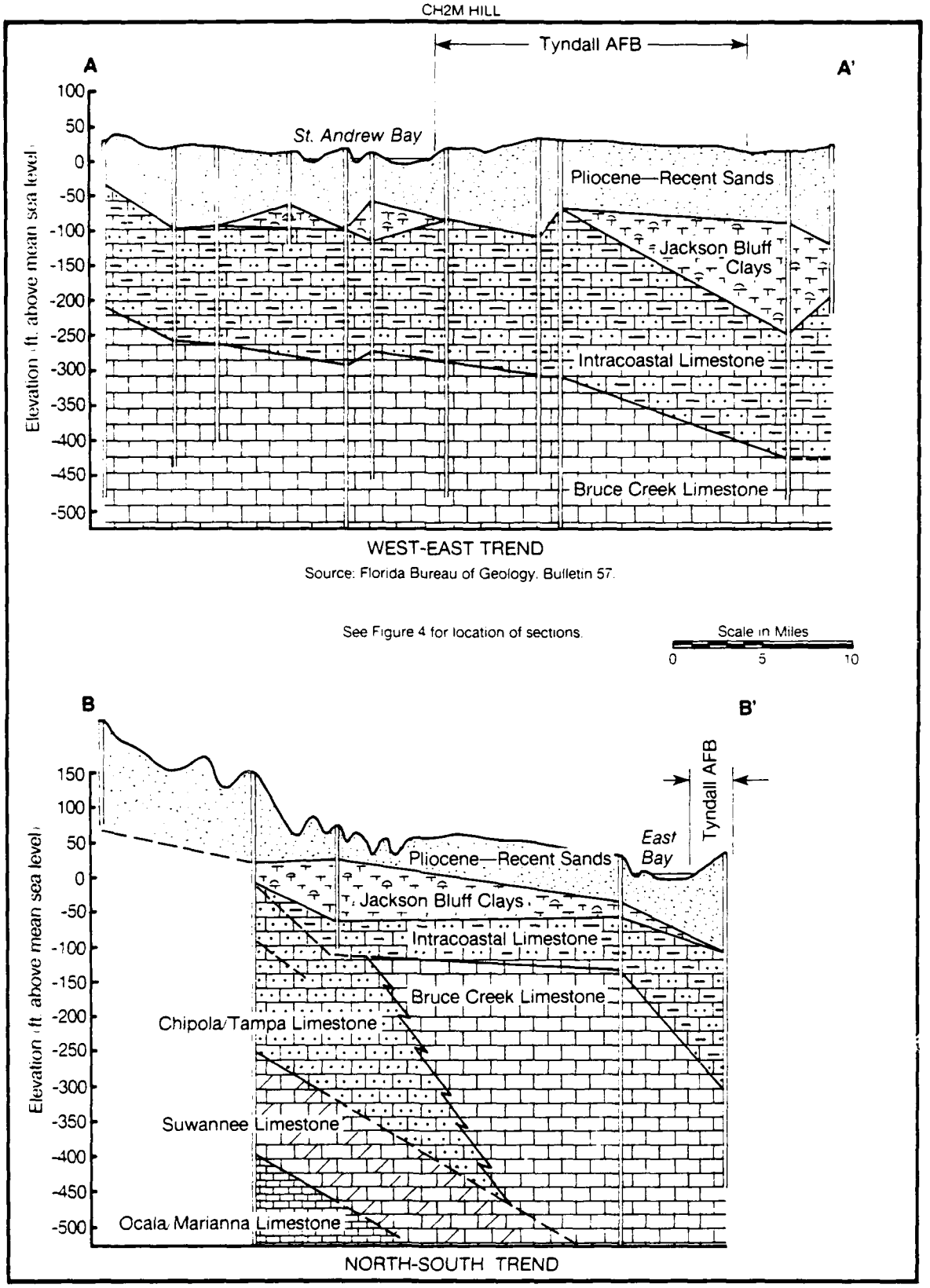

FIGURE 5. Typical geologic cross section of Tyndall AFB.

of ground water. In some parts of Bay County, the lower portion of this formation forms an impermeable clayey sand strata which effectively prevents ground-water movement. However, well logs available at Tyndall AFB did not record a significant thickness of clayey sand.

From 110 feet to approximately 330 feet deep, poorly cemented shell beds of the Intracoastal Formation are present. This layer contains abundant fossils, quartz sand, and calcium carbonate grains that are cemented by crystalline calcite and clay. The upper portion of the formation is of Pliocene age (less than 10 million years ago) and is relatively impermeable, whereas the lower portion is of Miocene age (more than 10 million years ago) and is highly permeable.

Below 330 feet deep and extending to depths greater than 600 feet are limestones of Miocene age which belong to the Bruce Creek Formation. These limestones are white to light yellow-grey and moderately consolidated. Permeability is very high because of interconnected voids and solution cavities in the limestone.

Formations below 600 feet consist of various strata of limestone, clay, sandstone, shale, and quartzite down to a basement granite occurring at a depth of approximately 13,000 feet below land surface.

C. Hydrology

Rainfall on the Tyndall AFB peninsula either percolates into the ground directly or flows across the ground surface into the water bodies surrounding the peninsula. In general, runoff from areas on the north side of U.S. Highway 98 flow into East Bay and St. Andrew Bay and areas on the south and west sides of U.S. Highway 98 drain into St. Andrew Sound, St. Andrew Bay, and the Gulf of Mexico.

In the vicinity of the flight line, the maintenance and administrative areas, and family housing areas, the predominant surface-water drainage features consist of storm sewers and ditches. Surface drainage features and directions of drainage runoff are shown on Figure 6.

Rainfall that percolates into the ground is stored temporarily in the water table aquifer, which is the uppermost of two aquifer systems. This 100-foot-thick aquifer is composed of fine to coarse sand with typical moderate permeability values on the order of 0.01 cm/sec. The water table aquifer has a water surface that rises during periods of heavy rainfall and declines during periods of low rainfall; yearly fluctuations on the order of 5 feet are typical. The average depth to ground water varies from about 1 to 10 feet over most of the base, but may be as deep as 15 feet near the coastal ridge along U.S. Highway 98.

The slope of the water table is relatively flat throughout the base. In general, the direction of ground-water movement follows the slope of the overlying terrain, flowing northeast and southwest from a high near the coastal ridge along U.S. Highway 98 (Figure 6). This regional pattern of ground-water movement is affected locally by bayous, streams, and ditches, where the ground water flows directly to these surface waters.

Perched ground water is present in isolated areas throughout the base where clayey sand and hardpan layers trap rainfall above the level of the surrounding water table. Perched ground water joins the regional ground-water aquifer where the confining layers are breached or absent.

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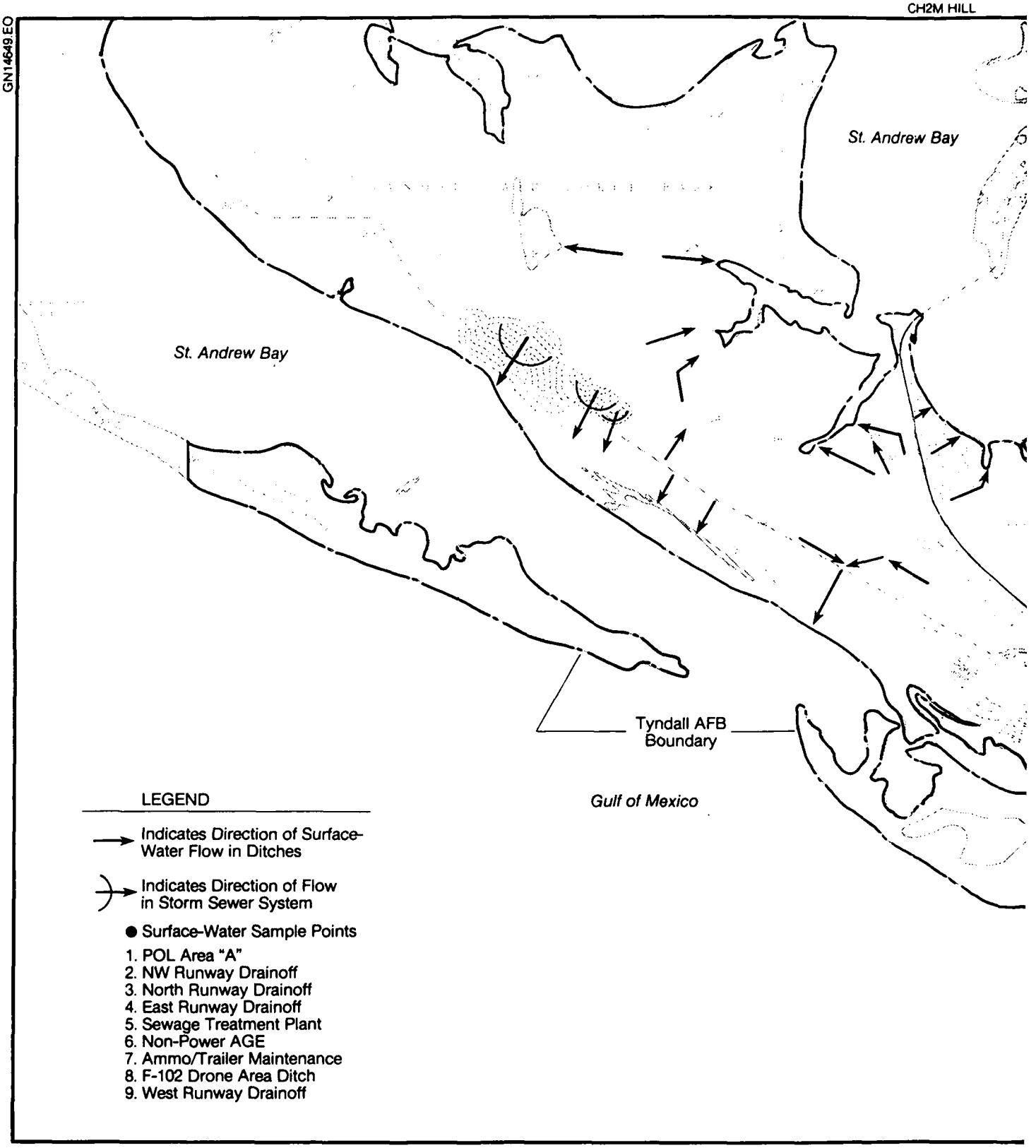
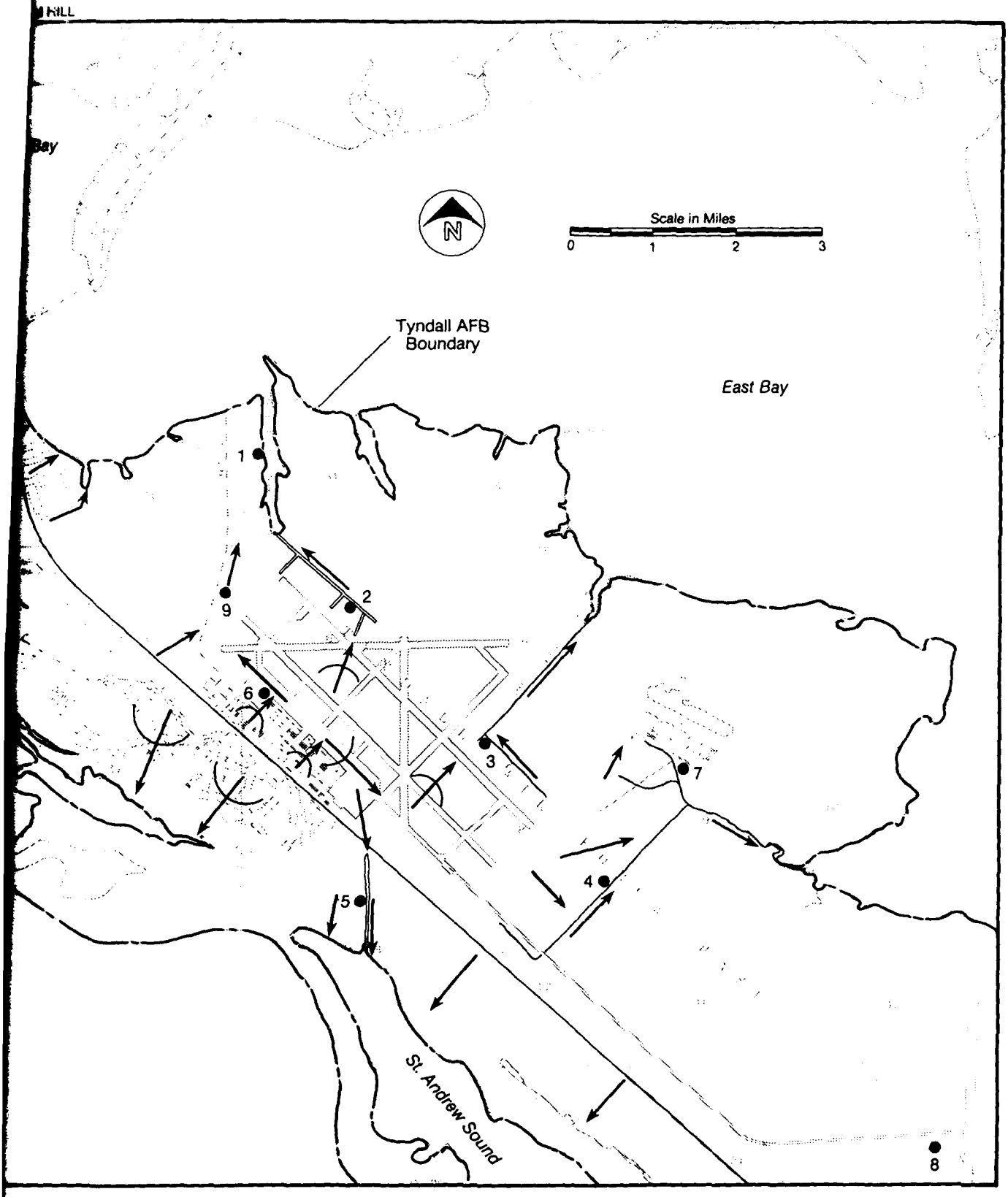


Surface drainage map at Tyndı



map at Tyndall AFB.

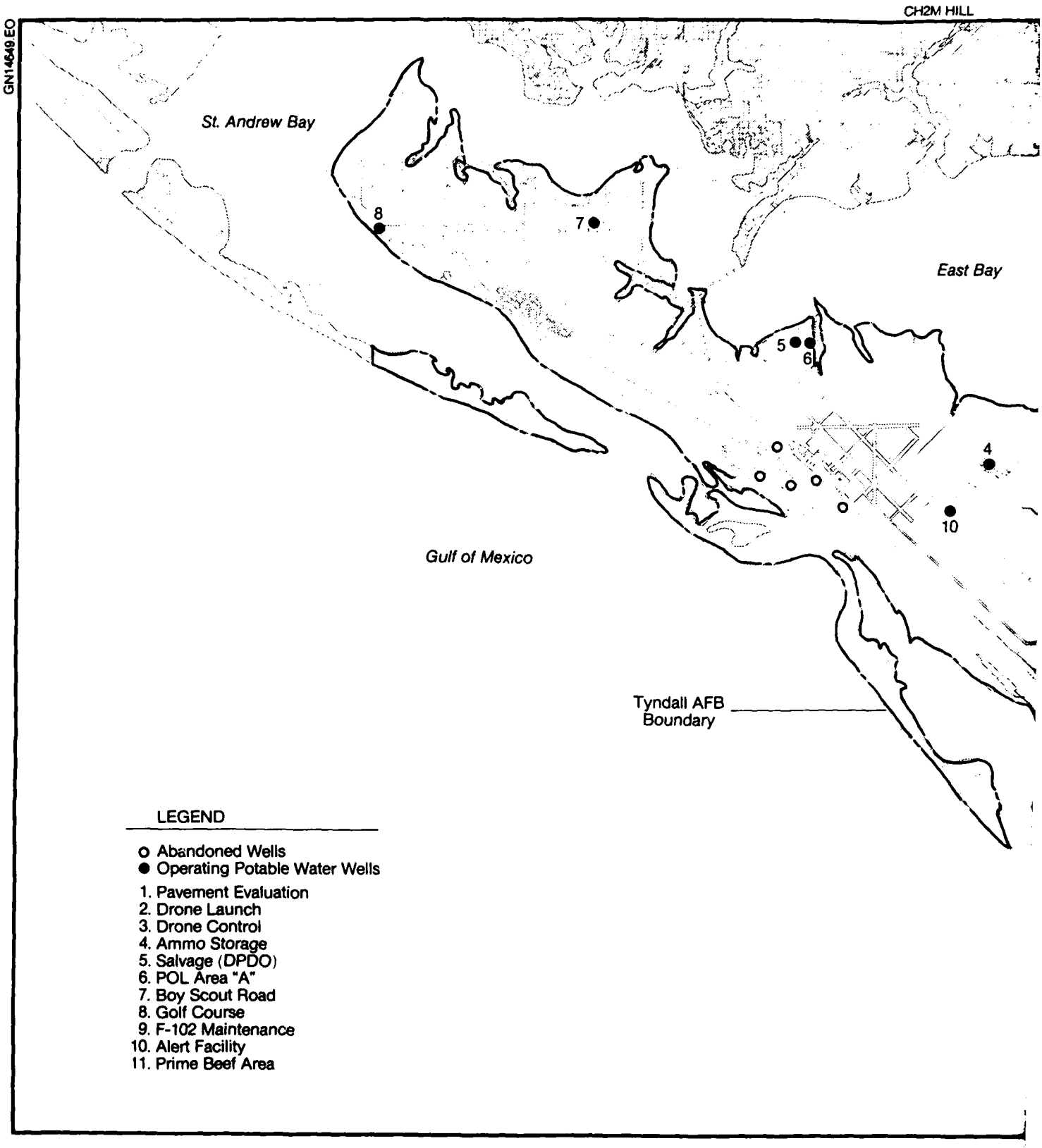
FIGURE 6.

Leachate from any landfill or disposal area on Tyndall AFB would probably travel downward to the water table aquifer, then follow the local pattern of ground-water movement towards streams, bayous or ditches, or directly to the bays surrounding the peninsula. Even though the soils in the Tyndall AFB area are moderately permeable, the rate of migration of any contaminated plume would be relatively slow due to the gradual slope of the water table. Where lenses of clayey sand and hardpan are present, vertical movement of the leachate will be impeded; the contaminated plume will migrate very slowly along the perched water table until joining the ground-water aquifer wherever the hardpan is breached or absent.

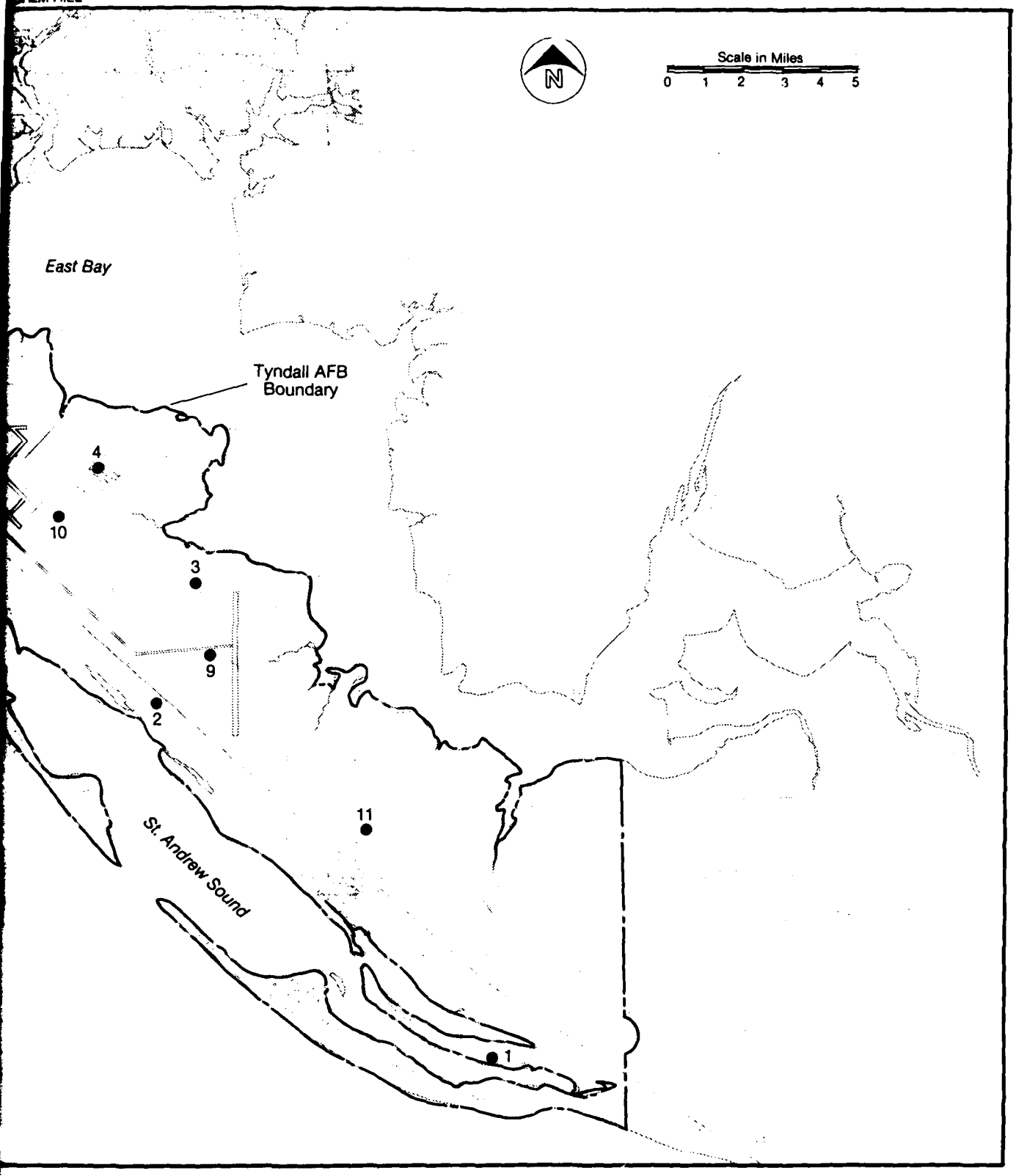
The second aquifer system at Tyndall AFB, the Floridan aquifer, is separated from the upper water table aquifer by a clayey sand and clayey shell stratum about 150 feet thick. Permeability of this clayey sand and clayey shell stratum is unknown, but is believed to be low because of the presence of clay in this stratum. The Floridan aquifer occupies the lower, permeable portions of the Intracoastal Formation as well as the highly permeable limestones of the Bruce Creek Formation. The aquifer is approximately 1,100 feet thick, although potable water occurs only between depths of about 250 and 500 feet. The average transmissivity of the Floridan aquifer is estimated to be on the order of 100,000 gpd per foot.

Eleven wells at Tyndall AFB tap the Floridan aquifer. The locations and depths of these wells are shown on Figure 7. The average yield of these wells is estimated to range from 5 to 10 gpm per foot of drawdown.

The Floridan aquifer is an artesian aquifer; that is, water levels in wells completed in this aquifer rise above the top of the aquifer. Water levels in the vicinity of Tyndall AFB are indicated by the potentiometric surface



Location of potable water wells at Ty



water wells at Tyndall AFB.

FIGURE 7.

contour map shown on Figure 8. Pumping from wells on the base causes localized depressions in the potentiometric surface, lowering the surface below mean sea level, depending on the rate of pumping. The main water supply for Tyndall AFB is obtained from Bay County. Less than 1 percent of the water demand is withdrawn from wells located on Tyndall AFB.

Most of the water in the Floridan aquifer originates in Washington, Holmes, and Jackson Counties in Florida and in southern Alabama. Local recharge is effectively prevented by the strata of low permeability in the upper portions of the Intracoastal Formation. Water within the Floridan aquifer flows underground in a southwesterly direction beneath the Tyndall AFB peninsula and eventually exits into the Gulf of Mexico.

The potential for off-base migration of leachate vertically to the Floridan aquifer is low due to the presence of a low-permeability confining stratum about 150 feet thick. Should any contamination percolate through to the aquifer, however, it would be collected in Tyndall AFB wells or would migrate to the southwest and exit into the Gulf of Mexico. The closest public water supply wells are located near Hathaway Bridge, approximately 12 miles northwest of Tyndall AFB.

D. Ecology

1. Habitat

Tyndall AFB is nearly surrounded by saltwater ecosystems stretching along 60 miles of coastline. Major habitats at Tyndall AFB include stands of planted pines, coastal dune communities, saltwater marshes, and freshwater ponds. These areas are shown on Figure 9.

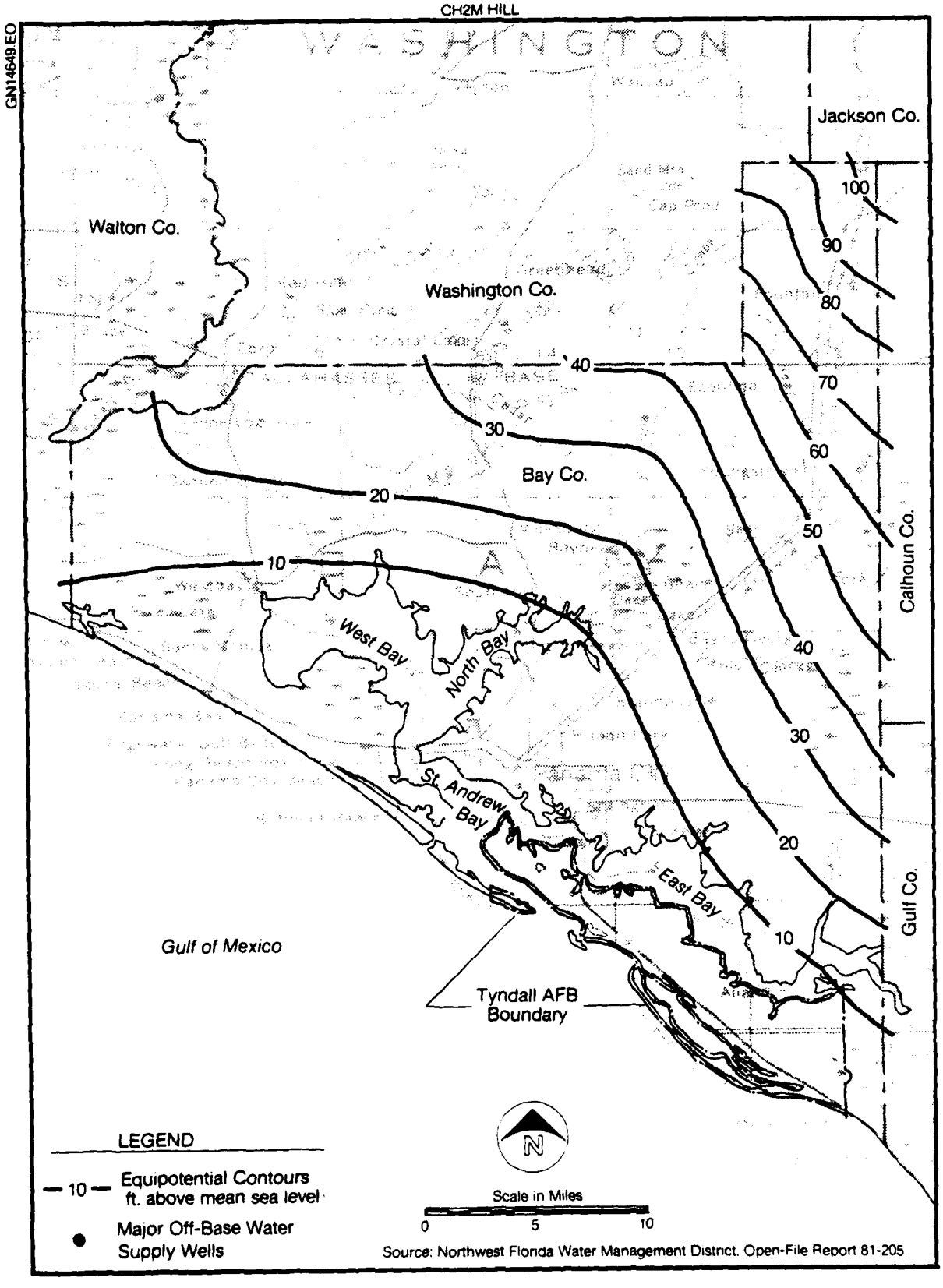


FIGURE 8. Potentiometric surface of the Floridan aquifer, 1980.

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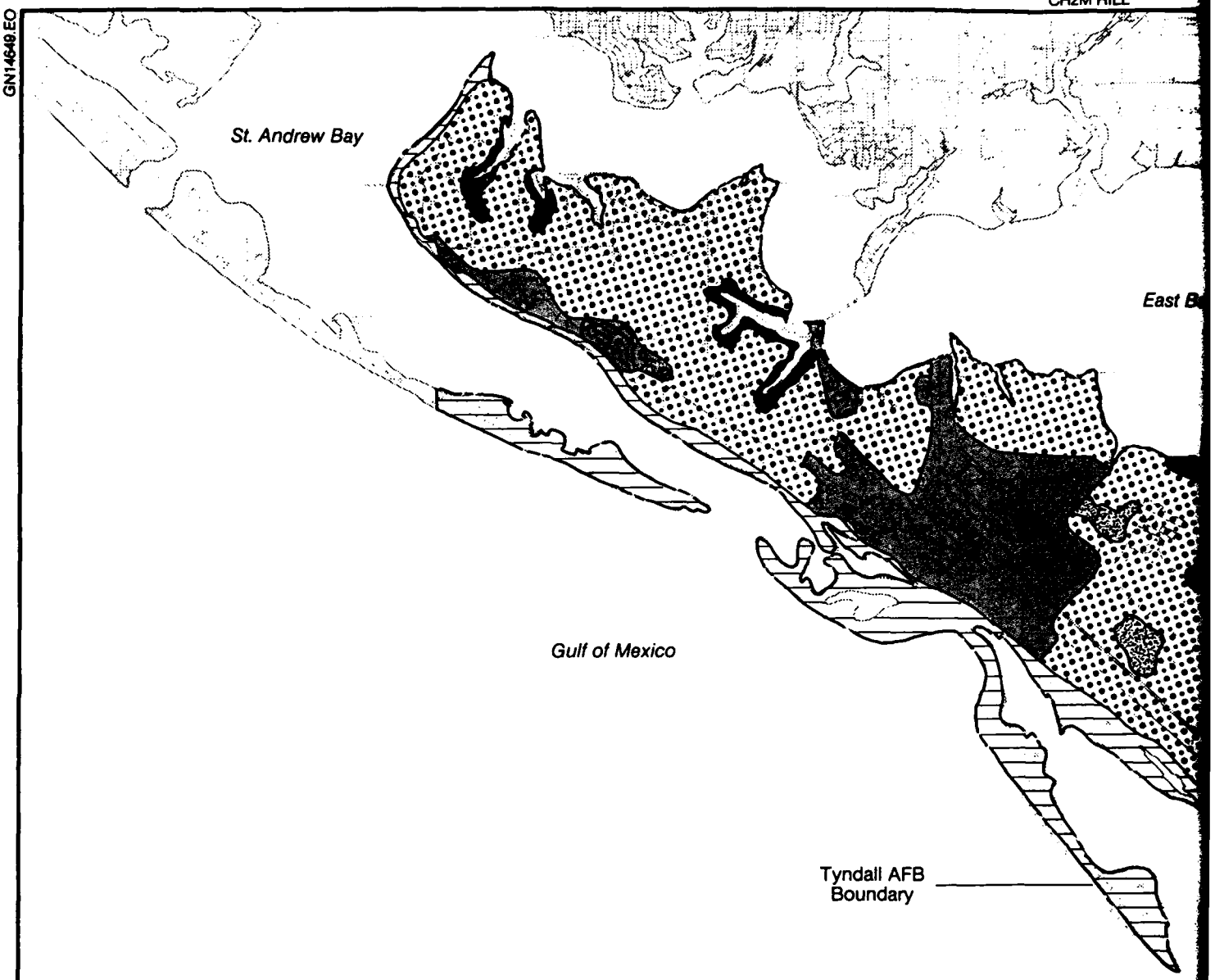
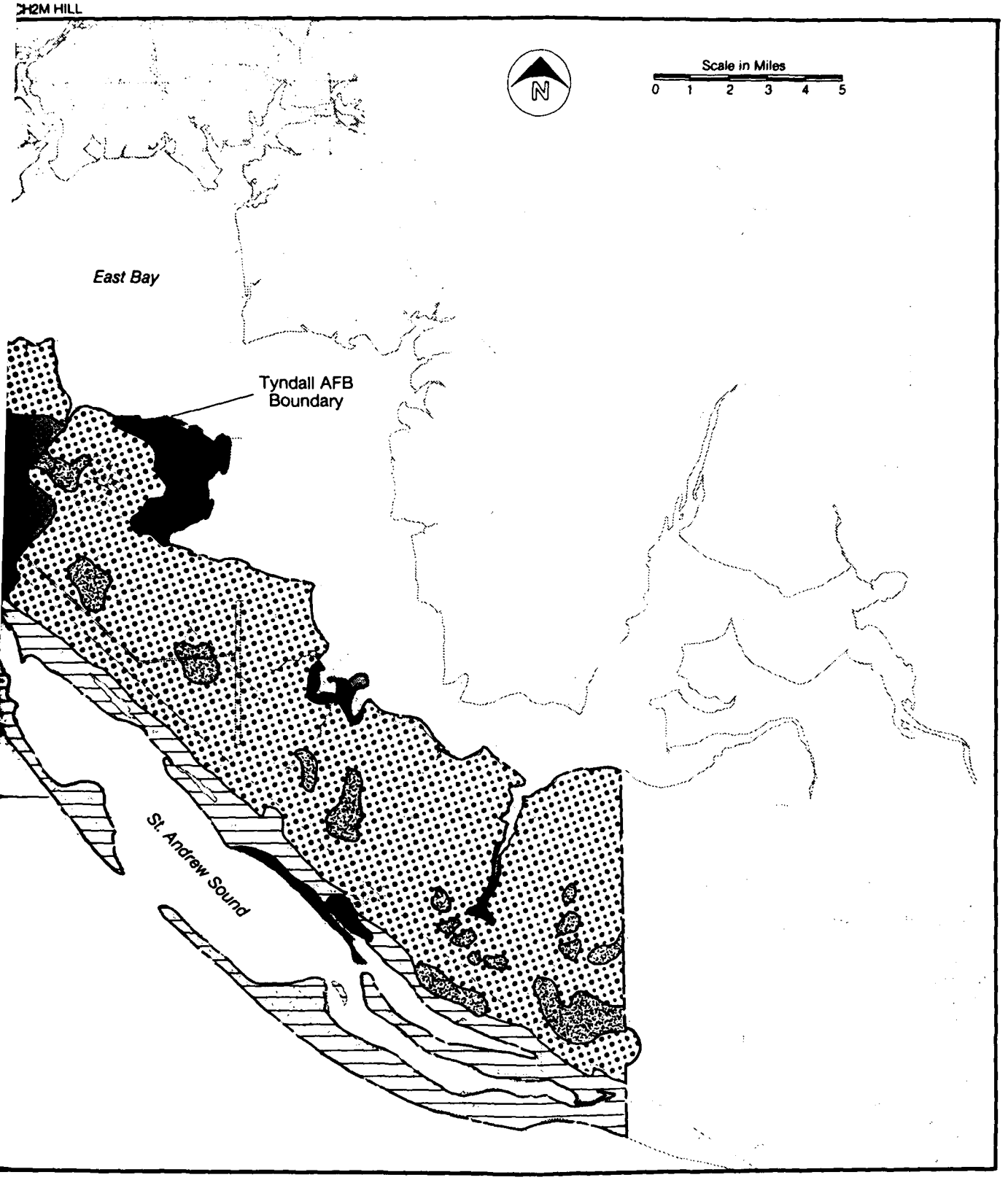


Source: Florida Department of Natural Resources, 1975.

Major plant communities at Tyn



mmunities at Tyndall AFB.

FIGURE 9.

The dominant plant community at Tyndall AFB consists of three species of planted pines: sand pine on well-drained soils, longleaf pine on intermediate areas, and slash pine on poorly drained soils. Adapted pine species are planted in their own optimal habitat to ensure healthy growth of trees for pulpwood production. Scattered areas of sand live oak, live oak, runner oak, scrub oak, saw palmetto, gallberry, and wiregrass are found interspersed in pine woods providing some diversity of wildlife habitat. Whitetailed deer are common on the base and are harvested through managed hunts. Additional habitat diversity is provided by scattered fields planted in millet which are managed for dove and quail hunting. Many non-game animals also utilize these terrestrial habitats for food and shelter.

Freshwater habitats include 102 acres of man-made ponds, which are managed for recreational fishing and duck hunting; and scattered wooded ponds and shrub bogs with cypress, black gum, red maple, and titi. Natural and manmade channels and ditches are often lined by wax myrtle.

Other key habitats at Tyndall AFB include coastal dune communities which are visually dominated by rosemary and sea oats, and white sand beaches utilized heavily by shorebirds. Salt marshes on the bayside of Tyndall AFB are dominated primarily by saltwater spike rush and smooth cordgrass. These saltmarsh plant communities cover large areas of low ground between the pine woods and the saltwater communities, and are considered to be critical wetland habitats for preservation.

The saltwater areas adjacent to Tyndall AFB are covered by extensive grass bed habitats dominated by shoalgrass, turtle grass, and manatee grass with an abundant, diverse fauna of finfish and shellfish. Over 120 species of finfish have been identified in the St. Andrew Bay system near the

base and commercial harvesting of shrimp, scallops, and oysters is an important business in this area.

East Bay along the northeast boundary of Tyndall AFB is a Class II water, designated for shellfish propagation and harvesting. The waters at the northwest end of Tyndall AFB are a designated Aquatic Preserve, a protected status similar to Class III waters. The rest of the saltwater habitats surrounding the base are Class III waters designated for recreation and propagation of fish and wildlife.

2. Endangered and Threatened Species

Table 2 lists the threatened and endangered plant and animal species occurring in the vicinity of Tyndall AFB. This list inclues amphibians, reptiles, birds, mammals, and plant species, some of which occur in no other area of the world. For instance, the giant water dropwort, a wetland plant species, is found in just three Florida counties, with only one population of about 100 plants known at Tyndall AFB. Chapman's crownbeard, another threatened endemic plant, is even less common on the base.

Other species on the list are more abundant such as the American alligator which is frequently seen in freshwater ponds and saltwater bayous, the osprey which occupies freshwater and saltwater habitats, and the Florida gopher tortoise which inhabits the drier, upland habitats. The species which are associated with wetland or open water habitats are especially vulnerable to any hazardous contaminant migration from Tyndall AFB.

Table 2
THREATENED AND ENDANGERED SPECIES OCCURRING IN THE VICINITY OF TYNDALL AFB, BAY COUNTY, FLORIDA

Common Name	Scientific Name	Status[a]		Habitat
		State	Federal	
Florida gopher frog	Rana areolata aesopus	T		Sand pine scrub
Green sea turtle	Chelonia mydas	E	E	Coastal waters
Atlantic loggerhead	Caretta caretta	T	T	Coastal waters
Florida gopher tortoise	Gopherus polyphemus	T		Oak hammock, sand pine
American alligator	Alligator mississippiensis		T	ponds, marshes
Indigo snake	Drymarchon corais	T	T	pine flatwoods, hammocks
Wood stork	Mycteria americana	E		Wetlands
Peregrine falcon	Falco peregrinus	E	E	Migrant
Snowy plover	Chavadrius alexandrinus	E		Dry sandy beaches
Brown pelican	Pelecanus occidentalis	T	E	Coastal islands
Bald eagle	Haliaeetus leucocephalus	T	E	Occasional visitor
Osprey	Pandion haliaetus	T		Wetlands
Southeastern kestrel	Falco sparverius paulus	T		Open forest and fields
Least tern	Sterna albifrons	T		Open sandy areas
Choctawhatchee beach mouse	Peromyscus polionotus allophrys	T		Coastal dunes
Black bear	Ursus americanus	T		Titi swamp thickets
Gulfcoast lupine	Lupinus westianus	T		Coastal dunes
Giant water dropwort	Oxypolis greenmanii	E		Cypress and flatwood ponds
Chapman's crown beard	Verbesina chapmanii	T		Open pine flatwoods
Large-leaved jointweed	Polygonella macrophylla	E		Sand pine-oak scrub

Source: Pritchard, 1978; Ward and Perkins, 1978; Ward, 1981.

[a] E--"Endangered"
T--"Threatened"

3. Environmental Stress

The helicopter overflight as well as ground surveys of identified disposal areas revealed no significant areas of visible environmental stress. A small patch of dead trees was observed downslope of the Spray Field Vicinity Landfill; however, the cause of death, whether from natural or man-induced stresses, could not be determined. Abundant growths of aquatic iron bacteria were found in the drainage ditch adjacent to this same fill. The absence of these bacteria upstream of the fill site indicates the presence of leachate in the landfills. Native vegetation in and along this ditch was found to be abundant both upstream and downstream of the landfill site.

IV. FINDINGS

IV. FINDINGS

A. Activity Review

1. Industrial Operations

The industrial activities at Tyndall AFB involve maintenance operations for assigned aircraft including F-101 and F-106 fighter interceptors; F-100 and F-102 drone aircraft; T-33 jet trainers; and transient aircraft including F-4 and F-15 aircraft. A master list of industrial activities is included in Appendix E.

A review of base records and interviews with present and former base employees resulted in the identification of those industrial operations where the majority of industrial chemicals are handled and hazardous wastes are generated. Table 3 gives a summary of the major industrial activities including the estimated hazardous waste quantities produced by these operations, and the present and past disposition of these wastes, i.e., treatment, storage, or disposal. A description of the major industrial activities is included in the following paragraphs.

Building 158

Building 158 houses a variety of industrial operations including aircraft corrosion control, a lead acid battery shop, and a pneudraulics shop.

The aircraft corrosion control operation began in 1955 and includes an acid cleaning operation for aircraft parts, a machine shop, and a parts painting shop. Wastes generated from these operations include small quantities (less than 35 gallons per month) of paint residues and thinners, methyl ethyl ketone, and aliphatic naphtha solvents;

TABLE 3.
MAJOR INDUSTRIAL OPERATIONS SUMMARY

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity	T/S/D Methods 1950 1960 1970 1980
325 EMS				
Corrosion Control	158	Paint residues and thinners Methyl ethyl ketone Aliphatic naphtha	35 gal./mo. 20 gal./mo. 8 gal./mo.	POL Waste Storage[a] — DPDO Contractor Sale or Disposal
Acid Cleaning Room	158	Paint remover Methyl ethyl ketone Alkaline and acid cleaners Chromium trioxide	35 gal./mo. 10 gal./mo. 25 gal./mo. 1 gal./mo.	POL Waste Storage[a] — DPDO Contractor Sale or Disposal Sanitary Sewer
Aircraft Paint Hangar	315	Paint residue and thinners	300 gal./mo.	Pretreatment[b] Sanitary Sewer — DPDO Contractor Sale or Disposal
Aircraft Washrack & Paint Stripping	83	PD 680 Paint remover Alkaline cleaning solution Waste oil and grease	400 gal./mo. 1,200 gal./mo. 400 gal./mo. 15 gal./mo.	Pretreatment[b] Sanitary Sewer

Notes: ——— = Time frame confirmed by shop personnel.
..... = Time frame assumed by shop personnel.
T/S/D = Treatment, Storage, or Disposal

[a]Two 20,000-gallon POL waste storage tanks; final disposition was sale to contractors and fire training.

[b]Pretreatment consists of oil/water separators.

TABLE 3.
(Continued)

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity	T/S/D Methods (1950 1960 1970 1980)
Wheel & Tire Shop	540	PD 680	180 gal./mo.	POL Waste Storage[a] (- - - ——) DPDO Contractor Sale or Disposal
Aerospace Ground Equipment (AGE)	264	PD 680 Hydraulic oil Engine oil	30 gal./mo. 10 gal./mo. 15 gal./mo.	POL Waste Storage[a] (——) DPDO Contractor Sale or Disposal
Fuel System Repair	316	JP 4	750 gal./mo.	Pol. Waste Storage[a] (——) Facility 21 Fire Training
325 CRS				
Engine Cleaning Plant	258	Trichloroethylene	55 gal./yr.	DPDO (- - -) Contractor Disposal
		Acid cleaning solutions	500 gal./yr.	Neutralization (——) Sanitary Sewer
		Alkaline descaling solution Chromic acid solutions	1000 gal./yr. 500 gal./yr.	Contractor Removal (——) and Disposal
NDI Lab	310	Penetrants	300 gal./yr.	POL Waste Storage[a] (——) DPDO Contractor Sale or Disposal

Notes: ——— = Time frame confirmed by shop personnel.
..... = Time frame assumed by shop personnel.
T/S/D = Treatment, Storage, or Disposal
[a]Two 20,000-gallon POL waste storage tanks; final disposition was sale to contractors and fire training.
[b]Pretreatment consists of oil/water separators.

TABLE 3.
(Continued)

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity	T/S/D Methods (1950 1960 1970 1980)
Bearing Cleaning Shop	258	PD 680 Cresylic acid and o-dichlorobenzene 7808 oil	250 gal./yr. 250 gal./yr. 250 gal./yr.	POL Waste ——— Storage[a] → DPDO Contractor Sale or Disposal
Lead Acid Battery Shop	158	Dilute sulfuric acid	750 gal./mo.	Neutralization - - - Sanitary Sewer
Pneudraulics Shop	227/158[c]	Cresylic acid and o-dichlorobenzene Tetrachloroethylene PD 680 Note: Trichloroethylene used prior to 1979	20 gal./yr. 50 gal./yr. 220 gal./yr.	POL Waste ——— Storage[a] → DPDO Contractor Sale or Disposal
General Aircraft Maintenance	Numerous Locations	Hydraulic fluid PD 680 Engine oil	14 gal./mo. 55 gal./mo. 20 gal./mo.	POL Waste - - - Storage[a] → DPDO Contractor Sale or Disposal
		JP 4	150 gal./mo.	POL Waste - - - Storage[a] → Facility 21 Fire Training

Notes: ——— = Time frame confirmed by shop personnel.
..... = Time frame assumed by shop personnel.
T/S/D = Treatment, Storage, or Disposal

[a]Two 20,000-gallon POL waste storage tanks; final disposition was sale to contractors and fire training.
[b]Pretreatment consists of oil/water separators.
[c]Building 227 used from 1962 to 1979, building 158 from 1979 to present.

paint remover; alkaline and acid cleaning solutions; and chromium trioxide cleaning solution. Waste paint residues, thinners, and solvents are currently collected in 55 gallon drums and periodically sent to the Facility 550 waste storage tanks. In the past (prior to 1980) these wastes were sent to POL waste storage tanks, located at fire training areas. Waste acid and alkaline cleaners (25 gallons/month) and chromium trioxide cleaners (1 gallon/month) are disposed of to the sanitary sewer.

The lead acid battery shop has been in operation since 1942. Wastes generated from the servicing and charging of lead acid batteries consists of small quantities of dilute sulfuric acid. The waste acid is stored in a holding tank and neutralized with sodium bicarbonate prior to disposal to the sanitary sewer. Used battery casings are sent to DPDO for salvage.

The pneudraulics shop was moved to Building 158 in 1979. It was previously located in Building 227 from 1962 to 1979. Operations in this shop include bench check and repair of aircraft hydraulic and pneudraulic equipment. Wastes generated by this operation include small quantities of PD 680 cleaning solvent (55 gallons/year); tetrachloroethylene (55 gallons/year); and carbon remover consisting of a mixture of cresylic acid and *o*-dichlorobenzene from the ultrasonic degreaser (55 gallons/year). Currently, the wastes are sent to the Facility 550 waste storage tanks. Previously (prior to 1980), the wastes were collected in bowsers and taken to POL waste storage tanks located at fire training areas. Prior to 1979, trichloroethylene (TCE) was used in the ultrasonic degreaser. The TCE has since been replaced by tetrachloroethylene. The quantity of waste trichloroethylene from prior operations is estimated to be 55 gallons per year.

Building 315

Building 315 is the aircraft paint hangar, which was constructed in 1972. Operations involve painting of entire aircraft--current production is about 55 aircraft per year. Waste paint residue and thinners (about 300 gallons per month) are currently collected in 55-gallon drums. Final disposition of this waste is awaiting hazardous waste testing. Washdown water is discharged to an oil/water separator for pretreatment and disposal to the sanitary sewer. Waste from the oil/water separator is removed periodically by a contractor and sent to the Facility 550 waste storage tanks. All waste from this area probably went to the oil/water separator and sanitary sewer in the past.

Facility 83

Facility 83 is an aircraft washrack and paint stripping operation where aircraft are prepared for painting operations in Building 315. Common chemicals in use include an alkaline cleaning safety compound which is stored in a 10,000-gallon underground tank, PD 680 safety cleaning solvent, and phenolic and non-phenolic paint strippers. Wastes generated from this facility include PD 680 (400 gallons/month), paint strippers (1,200 gallons/month), alkaline cleaning compound (400 gallons/month), and waste oil and grease (15 gallons/month). The total washrack waste is pretreated in an oil/water separator and discharged to the sanitary sewer. The oil/water separator is periodically cleaned, and the waste residue is sent to the Facility 550 waste storage tanks. Prior to 1980, the waste residue was sent to POL waste storage tanks at the fire training areas. This facility has been in operation since 1961. Previous smaller-scale washrack operations were conducted in Building 158 from 1941 until 1961.

Building 258

Industrial operations conducted in Building 258 include engine cleaning and bearing cleaning. The bearing cleaning operation has been conducted since 1956, while the engine cleaning operation has been conducted since 1970.

The engine cleaning operation consists of seven vats containing various acid cleaning and etching solutions, alkaline descaling solutions, and carbon removal solutions. The operation also has a TCE vapor degreaser. Wastes generated from the engine cleaning operation include sludge from the TCE vapor degreaser (55 gallons/year); acid cleaning solutions (500 gallons/year); alkaline descaling solutions (1,000 gallons/year); and carbon removal solution containing chromic acid (500 gallons/year).

Prior to 1980, the alkaline descaling and carbon removal vats were pumped out once per year by a contractor, and the contents were removed from the base. Currently, the contents are placed in drums and transferred to DPDO. The TCE from the vapor degreaser is recycled internally, whereas the sludge is removed once per year, placed in a drum, and sent to DPDO. The acid cleaning solutions are periodically neutralized with sodium bicarbonate and disposed of to the sanitary sewer.

The bearing cleaning operation includes a carbon cleaning vat containing a mixture of cresylic acid and o-dichlorobenzene; and PD 680 degreasing vats. Wastes generated from this operation include PD 680 (250 gallons/year); carbon cleaning solution (250 gallons/year); and 7808 oil (250 gallons/year). All wastes are currently sent to the Facility 550 waste storage tanks. Prior to 1980, the wastes were sent to POL waste storage.

Building 310

Building 310 contains an NDI laboratory. Waste penetrants, consisting primarily of petroleum base fluorescent dyes, from this laboratory amount to about 300 gallons/year. The waste is currently being held in 55-gallon drums awaiting the results of hazardous constituent testing. Prior to 1980, the wastes were sent to POL waste storage. This facility has been in operation since 1972.

Building 264

The AGE maintenance shop located in Building 264 generates PD 680 waste (30 gallons/year), and waste engine oil and hydraulic fluid (25 gallons/year). The waste is currently sent to the Facility 550 waste storage tanks. Prior to 1980, the wastes were sent to POL waste storage. This facility has been in operation since 1959.

Building 540

Building 540 contains the wheel and tire shop. Waste PD 680 (180 gallons/year) goes to Facility 550. Prior to 1980, the waste was sent to POL waste storage. This facility has been in operation since 1942.

Building 9706

The AFESC Field Technology facilities are headquartered in Building 9706 located in the eastern part of the base. Research and development activities include the development and testing of rapid runway repair materials. Chemicals used include concrete mixes, epoxys, and monomers for formulating acrylic polymers and other polymers for runway repair. All chemicals are used in the runway repair formulation and are "fixed" as inert mixtures of polymers and concrete. No hazardous wastes are generated from this

operation. The Field Technology operations have been conducted since 1978.

Building 530

The AFESC Pavements Testing Lab, located in Building 530, has been operational since 1974 and is involved with the testing of asphalt and concrete materials from Air Force Bases throughout the United States and the world. The primary hazardous material handled in this laboratory is trichloroethylene (about 40 gallons/month) which is used to dissolve asphalt. All trichloroethylene (TCE) is evaporated off as part of the testing procedure and no liquid wastes are generated. Empty TCE drums are triple rinsed and sent to DPDO for disposition. This lab is the largest user of TCE on base.

Other

Numerous aircraft and vehicle maintenance, repair, and minor painting operations generate small quantities of waste solvents including xylene, toluene, PD 680, and methyl ethyl ketone. These wastes are currently sent to Facility 550. Prior to 1980, all waste oils and solvents were sent to POL waste storage.

2. Summary of Industrial Waste Disposal Practices

There were never any large-scale "depot" type industrial operations at Tyndall AFB and the quantities of waste oils, solvents, paint residues, and thinners generated at Tyndall AFB are small, generally ranging from 20 to 1,000 gallons per year depending on the type of waste (Table 3). The records search indicates that there were no past chemical landfills or chemical disposal pit areas at Tyndall AFB.

The major industrial operations at Tyndall AFB involving hazardous chemicals and wastes have been in existence since the 1960's and 1970's. These activities include the pneudraulics shop (1962), the main aircraft washrack and paint stripping operation (1961), the main aircraft paint hangar operation where painting of entire aircraft takes place (1972), the engine chemical cleaning operation (1970), the bearing chemical cleaning operation (1956), the AGE maintenance shop (1959), and the NDI laboratory (1972). Consequently, the 60's and 70's include the time period most vulnerable to unauthorized disposal of drummed hazardous waste solvents and chemicals to base landfills. Some of the interviewees indicated that drummed wastes from the corrosion control operations (Building 158) and the paint hangar operation (Building 315) were sometimes sent to base landfills in the past. These drummed wastes could have included paint residues and thinners, methyl ethyl ketone, cresylic acid, o-dichlorobenzene, trichloro-ethylene, aliphatic naphtha, and paint remover. In view of the standard procedure for disposition of waste oils and solvents to designated POL waste storage tanks, and the small quantities of waste oils and solvents generated at Tyndall AFB, the quantity of waste oils and solvents which may have gone to on-base landfills in the past is judged to be small.

The present and past standard procedures for disposal of waste oils and solvents from the industrial areas of the base is as follows:

- 1943 to 1952: POL waste was stored in two 20,000-gallon underground tanks located at a fire training area northwest of the instrument runway. Final disposition was sale to contractors and fire training exercises.

- 1952 to 1968: POL waste was stored in two 20,000-gallon underground tanks located at a fire training area between the power check pads (Facility 84) and Highway 98. Final disposition of POL waste was sale to contractors and fire training exercises.

- 1968 to 1980: The two 20,000-gallon tanks from the above site were excavated and relocated to the original fire training area northwest of the instrument runway. Final disposition of POL wastes was sale to contractors and fire training exercises. A detailed discussion of fire training activities is included in Section IV (A.5) of this report.

- 1980 to present: POL wastes are stored in underground tanks with final disposition by salvage or proper contractor disposal through the DPDO. There are several POL waste storage tanks located throughout Tyndall AFB as follows:

  -- Four underground 12,000-gallon tanks, located near Building 550, are operated by DPDO and used for storage of waste solvents; waste lubricants and hydraulic fluids; waste fuels; and waste slop oil from oil/water separators.

  -- An underground 2,000-gallon waste oil/fuel holding tank is located at the Engine Test Cells, Facility 240.

-- An underground 1,000-gallon waste oil holding tank is located at the Hobby Shop, Building 934.

No problems with leaks in any of the above POL waste storage tanks were reported or observed during the onsite base visit.

3. Fuels

As with all Air Force bases, fuels handling, storage, and distribution is a major operation at Tyndall AFB. Fuels storage locations are summarized as follows:

a. POL Area "A" is the main POL storage area on-base and includes a barge off-loading facility on Shoal Point Bayou which has immediate access to East Bay. This tank farm is located northeast of the main runway in the "6000" area of the base. There are a total of 8 above-ground and diked fuel storage tanks with a total capacity of 2.25 million gallons. Fuels currently stored include JP4, JP5, and diesel.

b. POL Area "B" is the fuel supply area for aircraft and vehicles on the flight line and is located in the "500" area of the base. There are a total of 17 tanks, mostly underground, with a total capacity of 491,000 gallons. Fuels currently stored include JP4, diesel, and MOGAS.

c. There are 14 small fuel storage tanks located in various areas of the base with a total capacity of 91,000 gallons. Most of these tanks are underground.

A complete inventory of fuel storage tanks, including location, capacity, and type of fuel stored, is included in Appendix F. Our investigation did not reveal any problems with past or present major fuel leaks from the tank farms or fuel distribution lines. There was no indication of suspected fuel-saturated areas or reports of unusual petroleum odors or oil slicks emanating from the ground from any area on-base.

Some minor spills have occurred in the past, usually as a result of overtopping of fuel storage tanks. These spills occur infrequently and are contained in the diked areas surrounding the tanks. Most of the spilled fuel is recovered; however, some minor seepage into the ground probably has occurred within the diked areas.

Sludge is removed from major fuel tanks in POL areas "A" and "B" every 3 to 5 years. The residue or sludge from this operation (usually less than 1,200 gallons) contains mostly water with small quantities of rust, sediment, and fuel. This sludge is deposited in shallow trenches adjacent to the tank and allowed to weather from 4 to 6 weeks before the trench is filled with dirt. This is standard acceptable practice for disposal of the sludge, and the sludge residue is readily assimilated into the soil. However, some of the sludge from past cleaning operations contained lead from AVGAS storage tanks, and has probably resulted in some localized contamination of the soil with lead, especially in the main POL storage area "A." The Aeroclub currently stores AVGAS in one 3,000-gallon underground tank and one 20,000-gallon aboveground tank.

4. Abandoned Tanks

The records search indicated that Tyndall AFB has many abandoned tanks of small size (500- to 2,000-gallon capacity). These tanks, which contained heating oil, number

approximately 100 and were abandoned when the base heating system was converted to natural gas. Standard procedure when abandoning a tank was to pump out the remaining fuel and fill the tank with sand. No problems were identified during the records search to indicate fuel saturation from any abandoned tanks. An inventory of these abandoned tanks, including locations and sizes, is given in Appendix G.

Two aboveground AVGAS storage tanks at POL area "A", tanks 6035 and 6038, have also been abandoned. Tank 6035 had a capacity of 20,000 gallons for AVGAS storage. Tank 6038 had a capacity of 15,000 gallons and was used for storage of contaminated AVGAS. These tanks have been emptied and abandoned since 1974.

5. Fire Training Activities

Fire training activities are currently conducted at a new facility (1980) near Building 21, and only contaminated JP4 is used in the fire training exercises. A 12,000-gallon underground tank is used to store the contaminated JP4.

In the past, POL waste storage tanks were located at two old fire training area sites. Standard procedure on-base was to collect all comingled waste oils, fuels, and solvents from the industrial area in bowsers and drums and transport the waste to the POL waste storage tanks. The POL waste was then sold to contractors and also used in fire training exercises. Prior to 1970, these exercises were held 2 to 3 times each week; since 1970 the frequency has been only 2 to 4 times each month. In the fire training exercises, the POL waste was poured onto an old aircraft or simulated aircraft in a cleared, bermed 1/3-acre area and set on fire. Most of the POL waste was consumed in the fire. The quantities of POL waste which may have percolated into the ground from these exercises is judged to be small.

There were two past fire training areas prior to the construction of the new facility near Building 21.

- The first site was the original fire training area and was located northwest of the instrument runway. This was operated from 1943 until 1952, at which time fire training exercises were moved to the second site, described below. The fire training exercises were relocated to the original site in 1968. The two 20,000-gallon POL waste storage tanks were relocated from the second site at this time. Fire training exercises were moved to the new Facility 21 in 1980.

- The second site was located between the Facility 84 power check pads and Highway 98, and was operated from 1952 until 1968. Two 20,000-gallon POL waste storage tanks were located at this site.

6. Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) are among the most chemically and thermally stable organic compounds known to man. Until the mid-1960's, PCBs were considered nontoxic; however, further testing demonstrated that PCBs were high-risk chronic toxicants. Current knowledge indicates that PCBs accumulate in animal fatty organs and tissues, especially in fish and poultry, and that they can cause human liver and kidney damage through ingestion or direct contact. Because of their stability, PCBs, once introduced into the environment, persist for long periods of time and are not readily destroyed.

The potential sources of PCBs at Tyndall AFB are electrical transformers and capacitors. A program has been initiated to test all transformers taken out of service for PCB content.

Currently there are about 20 out-of-service PCB-containing transformers in protective storage in Building 3001. These transformers were moved to Building 3001 about 6 months ago and had previously been stored in Building 451. Prior disposition of all out-of-service transformers (prior to 1979) was to DPDO for salvage. Out-of-service sealed capacitors containing PCBs (each containing about 1 gallon of PCB oil) are currently transferred to DPDO for disposition. DPDO is responsible for the safe and environmentally approved disposal of all items containing PCB on-base.

The records search did not indicate any major PCB spills from leaking transformers, or past disposal of PCB-containing transformers and capacitors, or oil from PCB-containing transformers to base landfills. PCB contamination was not found to be a problem at Tyndall AFB.

7. Pesticides

Pesticides and herbicides are commonly used at Tyndall AFB for weed and pest control. The CE Entomology Department is reponsible for monitoring pesticide usage from golf course maintenance and roads and grounds; as well as its own operations.

The major pesticides in use include Diazinon, Baygon, and Dursban for roach control; Malathion and Dibrom for mosquito control; and Trimec, Sevin, Kerb 50W, Daconil, and Kovan for weed and fungus control. All pesticides and herbicides are EPA-registered chemicals, and proper preparation and application procedures are strictly adhered to with their use. Empty pesticide containers are triple rinsed, punched with holes, crushed, and sent to trash dumpsters for disposal. No indication was found from the records search that unused pesticides were disposed of on-base in the past.

Currently, there are no banned or restricted pesticides or herbicides in storage on-base. DDT was commonly used in the past for mosquito control. All stocked DDT (about 80 drums) was collected and turned over to DPDO in 1975 to be disposed of through the DPDO office at Eglin AFB. The DDT was sold to underdeveloped countries for control of malaria-bearing mosquitos. Also, 2-4-D and silvex have been used in the past for weed control by golf course maintenance. An inventory was made in 1980, and the entire stock (about 30 gallons) was turned over to DPDO for disposition.

The quantities of waste pesticides resulting from rinsing of empty containers and application equipment from past operations are judged to be small. The records search did not uncover any apparent contamination problems from past pesticide usage.

8. Wastewater Treatment

The existing main base wastewater treatment facility was constructed in 1943 as a trickling filter secondary treatment plant. The plant was expanded in 1975, at which time the treated effluent was rerouted from discharge to the Gulf and diverted to an 82-acre spray irrigation field. Another trickling filter plant, located at Capehart housing, was closed down in 1975, at which time all wastewater was diverted to the expanded main base plant. Problems with ponding in the spray field led to a decision to shut down the main base plant in 1984. At that time, all Tyndall AFB wastewater will be sent to the Bay County Regional Wastewater Treatment Lagoon which is described in Section V.

Design capacity of the main base plant is 1.5 mgd; daily flows from the base average about 1.0 mgd. The majority of this flow consists of domestic sewage; industrial wastewater flow, estimated to be about 10,000 gpd, comprises only 1 percent of the total average daily flow to the plant. The

industrial wastewater is pretreated in 10 oil/water separators prior to discharge to the sanitary sewer system. An inventory of these oil/water separator pretreatment facilities is given in Appendix H. Slop oil waste residue from the oil/water separators is removed periodically by contractors and taken to the Facility 550 POL waste storage tanks. Prior to 1980, the slop waste residue was taken to POL waste storage at the fire training area.

The waste sludge from the treatment plant is aerobically digested, dewatered on drying beds, and then used as a soil conditioner throughout the base. A recent analysis of the waste sludge (23 January 1981), using the EP toxicity test, showed that the sludge is non-hazardous. The quantities of industrial waste chemicals generated at Tyndall AFB and the contribution of industrial wastewater to the total wastewater flow are small.

The records search did not reveal any potential for hazardous material contamination from past or present wastewater treatment plant operations.

9. Other Activities

No records or information were found to indicate past testing or use of chemical or biological warfare agents at Tyndall AFB.

Some low level radioactive waste is generated at Tyndall AFB as follows:

a. Radioactive tubes containing Krypton 85 gas, part of the jet engine oil indication system, are replaced when necessary. Spent tubes are held in a 55-gallon drum located in a roped area of Building 258 and sent to Kelly AFB, Texas, for disposal.

b. The MA-1 shop, Building 188, is the respository for spent radioactive electron tubes which are stored in appropriate containers and sent to Kelly AFB for disposal.

No indication was found during the Records Search of the past disposal of radioactive material at Tyndall AFB.

Explosive Ordnance Disposal (EOD) activities are conducted in a secure area located south of the spray field. The EOD range has a 100-lb explosive limit. Waste ordnance is either burned or detonated in a steel reinforced pit. The total amount of waste ordnance disposed of by EOD is approximately 1,000 lb per year. The demolition debris from the EOD activities is disposed of in a burial pit located at the EOD range. No live ordnance is disposed of in the burial pit. EOD activities have been conducted in this area since the early 1950's.

Laboratory operations at Tyndall AFB include a base photo lab; two precision measuring equipment labs; AFESC laboratories including the environmental research lab, the Field Technology Testing lab and the pavements lab; a fuels testing lab; and a non-destructive inspection lab.

The non-destructive inspection lab and the AFESC pavements lab and Field Technology Testing lab have been discussed previously under "Industrial Operations." The remaining labs dispose of small quantities of common laboratory chemical solutions to the sanitary sewer; the photo lab practices silver recovery. Old chemicals which have exceeded their useful shelf life are sent to DPDO for disposition. The Records Search did not indicate that classified research lab activities using large quantities of exotic or radioactive chemicals were conducted in the past at Tyndall AFB.

The records search did not indicate past hazardous material contamination from any of the above activities.

10. Available Water Quality Data

The Bioenvironmental Engineering staff at Tyndall AFB is responsible for taking periodic samples from selected stormwater drainage ditches and potable water wells on-base.

a. Stormwater Monitoring

Stormwater drainage ditch samples are analyzed periodically at the locations shown on Figure 5. These sampling points are monitored routinely for oil and grease, and periodically for heavy metals. Recent sampling results do not indicate the presence of hazardous contaminants at these stormwater sampling points.

b. Drinking water Well Analysis

The main source of potable water for Tyndall AFB is through purchase from the Bay County Water Treatment Plant. Water demand averages about 3 mgd. In addition, there are 11 potable water wells at remote locations on-base as shown on Figure 6. These wells are analyzed periodically for heavy metals, pesticides, trihalomethanes, and volatile organic compounds. Recent test results indicate satisfactory water quality with no indication of hazardous contaminants.

c. Landfill Drainage Ditches

In 1979, the AFESC environmental research laboratory conducted a sampling program at the landfill located downgradient of the wastewater spray irrigation site (Site No. 7 on Figure 10). Samples were taken at two points along the south drainage ditch and at one point along the

north drainage ditch which borders the landfill site. Samples were analyzed by AFESC Environics Laboratory for conventional parameters, such as COD, TKN, phosphate, nitrate, and suspended solids; as well as heavy metals. The sampling results indicated good water quality with no hazardous contaminants present in the samples. The only metal found was iron (11 mg/l) in the north drainage ditch sample. Iron is indicative of leachate from the landfill.

In general, existing water quality data do not indicate the presence of hazardous contaminants in wells and drainage ditches at Tyndall AFB.

B. Disposal Sites Identification and Evaluation

1. Disposal Site Identification

Interviews with 35 past and present base personnel (Appendix D) resulted in the identification of 17 disposal sites at Tyndall AFB. The approximate locations of these sites are shown on Figure 10. Disposal sites at the off-base installations included in the records search are discussed in Section V of this report.

The following is a brief description of each site identified during the interviews and records search at Tyndall AFB. A summary of the approximate dates that each site was in use is given on Figure 11.

- Site No. 1, referred to as the Wherry Landfill, is located in the Wherry II Family Housing area on-base and was used from approximately 1943 until 1948 for disposal of general refuse including mess hall wastes. No known or suspected industrial type wastes or hazardous wastes were disposed of at this site. The operation consisted of 1/2-mile

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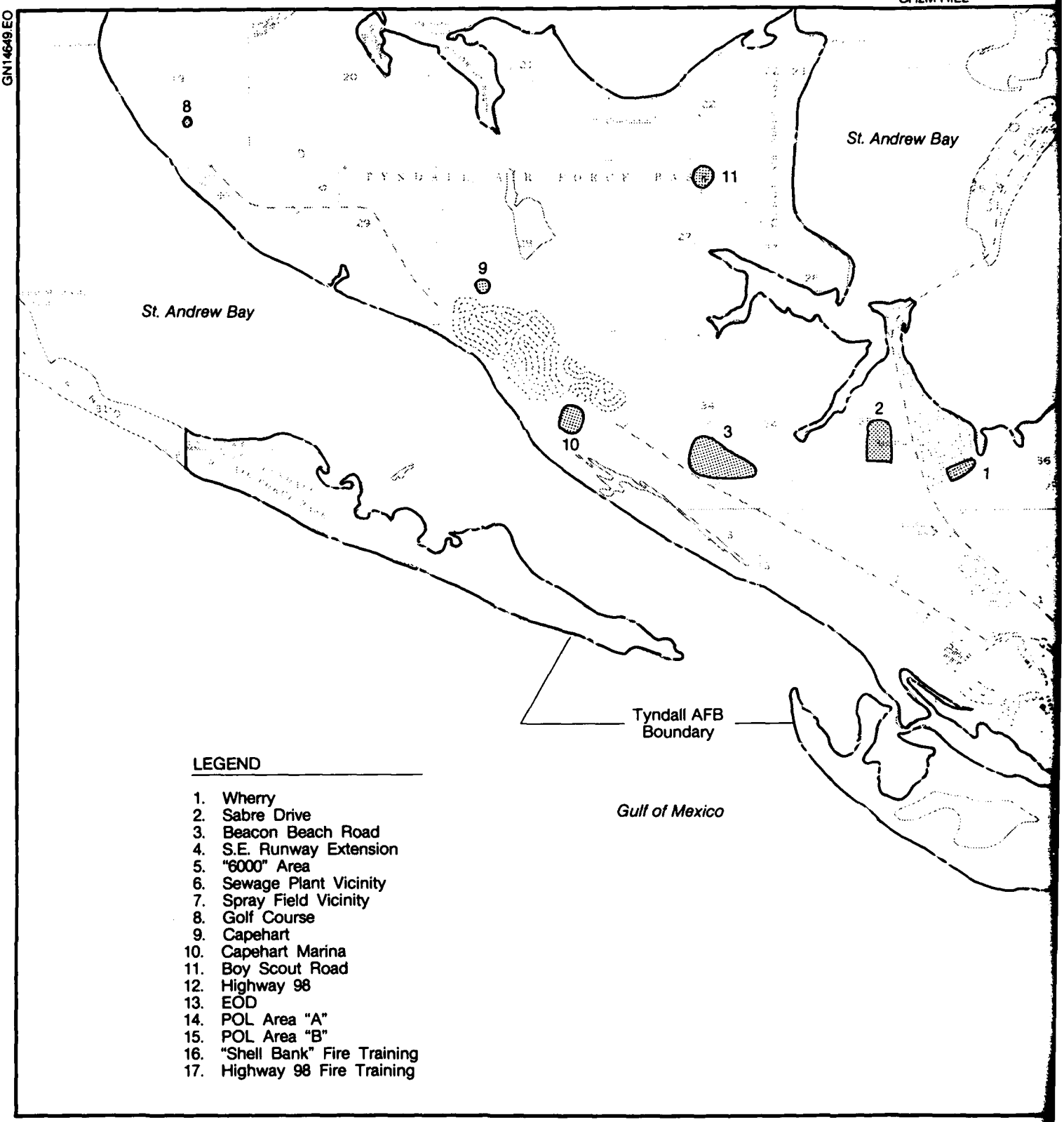
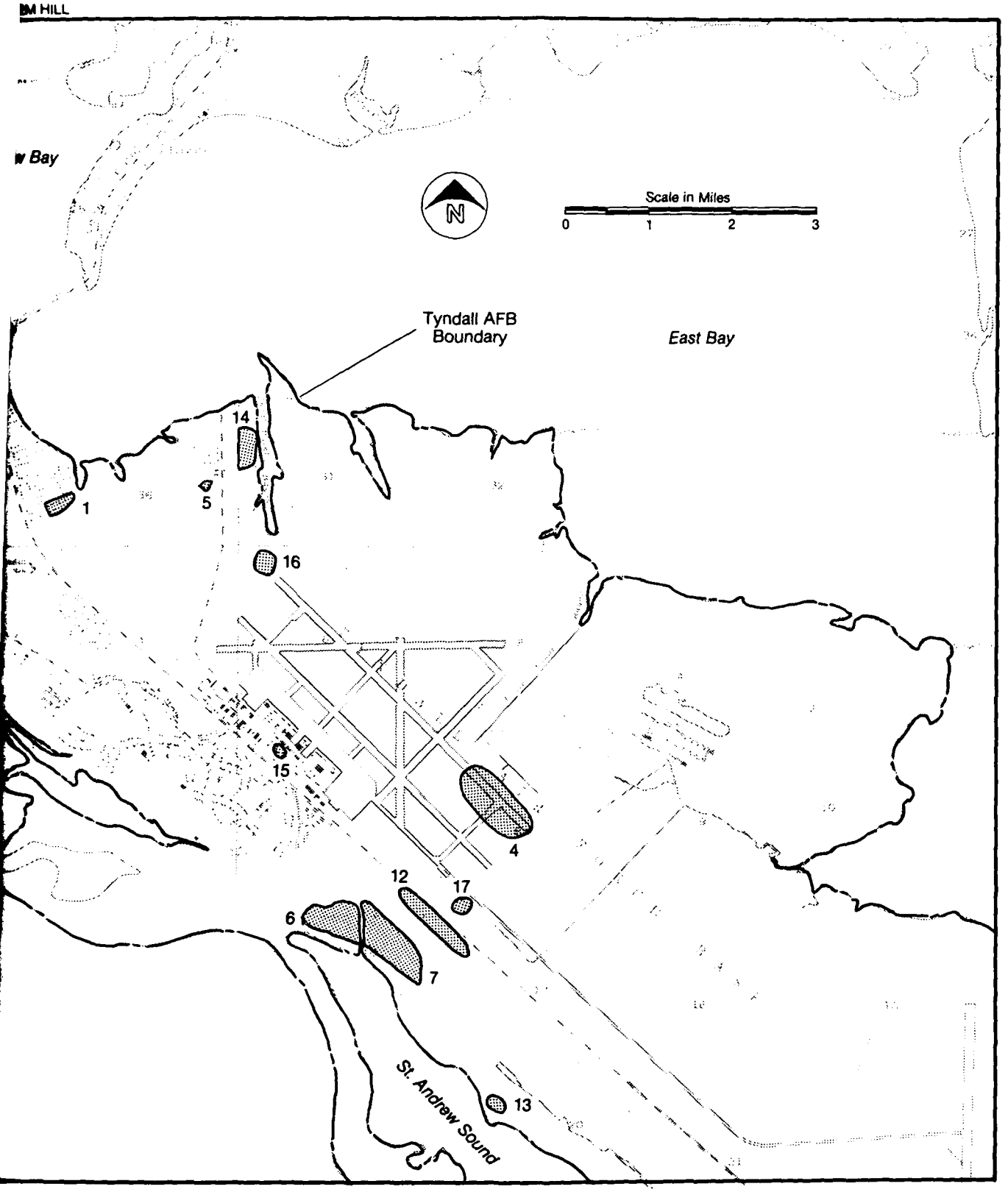


LEGEND

1. Wherry
2. Sabre Drive
3. Beacon Beach Road
4. S.E. Runway Extension
5. "6000" Area
6. Sewage Plant Vicinity
7. Spray Field Vicinity
8. Golf Course
9. Capehart
10. Capehart Marina
11. Boy Scout Road
12. Highway 98
13. EOD
14. POL Area "A"
15. POL Area "B"
16. "Shell Bank" Fire Training
17. Highway 98 Fire Training

Location map of identified disposal sites at



d disposal sites at Tyndall AFB.

FIGURE 10.

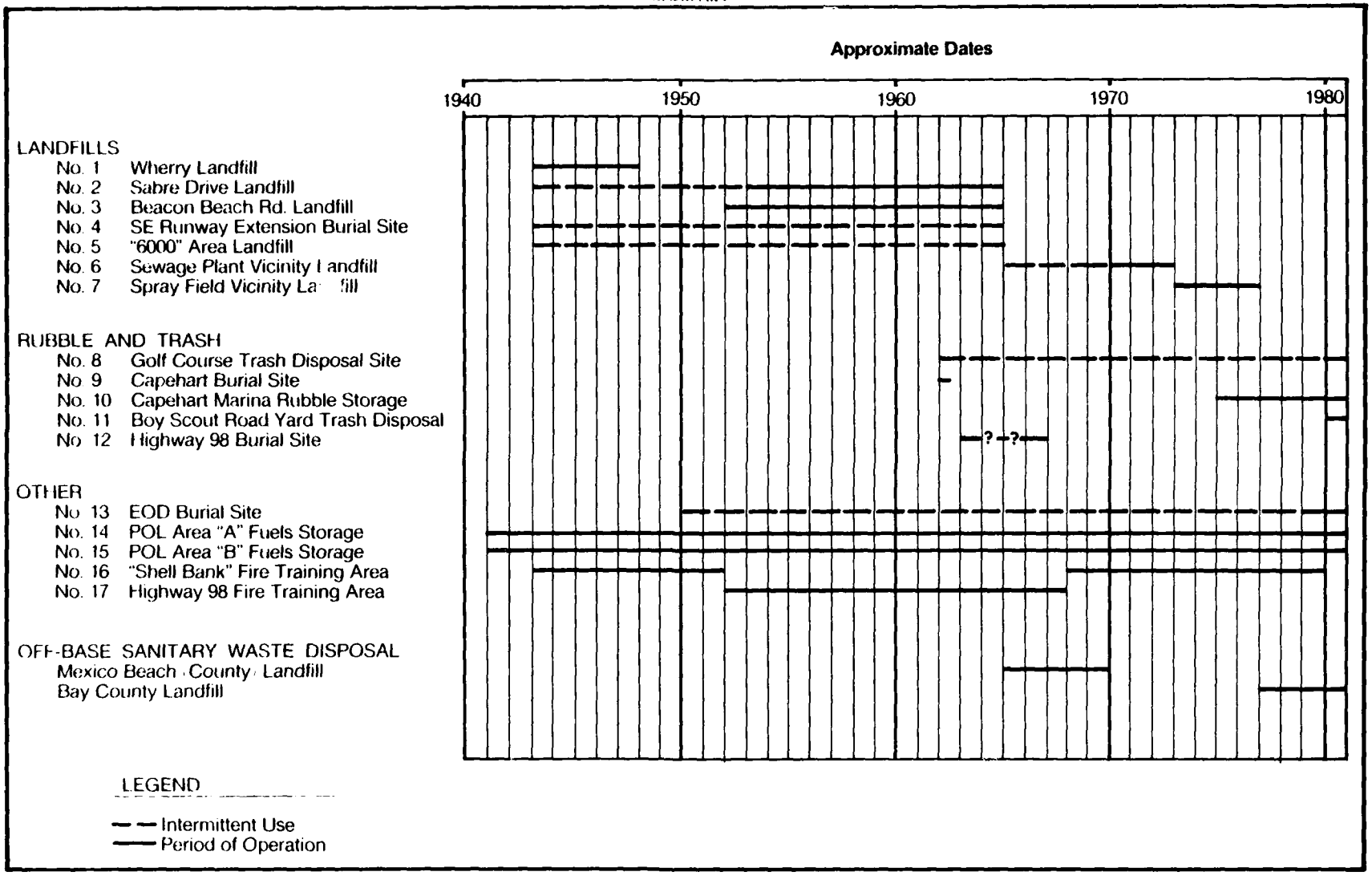


FIGURE 11. Historical summary of disposal activities at Tyndall AFB.

long trenches, which were 3 to 4 feet deep. The Wherry II Family Housing complex was constructed in 1951. During the mid-1970's, approximately 25 houses had to be removed from the area because of settlement and cracking of the house foundations.

- Site No. 2, referred to as the Sabre Drive Landfill, was used intermittently from 1943 to 1965, for disposal of general refuse. No known or suspected industrial type wastes or hazardous wastes were disposed of at this site. Some unauthorized dumping of garbage has been a problem in recent years, so that the area is currently fenced off and posted with signs prohibiting unauthorized dumping. The area is covered with typical old field vegetation indicative of past disturbed soil conditions. An old borrow pit is located at the northern end of the site.

- Site No. 3, referred to as the Beacon Beach Road Landfill, was used from 1952 to 1965 for general refuse disposal. No known or suspected industrial wastes or hazardous wastes were disposed of at this site.

- Site No. 4, referred to as the Southeast Runway Extension Burial Site, was reported by one of the interviewees to have been used intermittently from 1945 to 1965 for disposal of used containers, drums, old batteries, and old parts. No information was found to indicate the quantity of material disposed of in this area, or if the drums and containers were empty. Apparently, the material was disposed of in narrow excavated trenches. Some of this material was encountered in the borings made for the construction of the Southeast

Runway Extension. Information on past industrial operations indicates that the industrial shops, which generate the majority of hazardous wastes such as chlorinated solvents, were not in operation during this time. Therefore, no significant quantities of hazardous waste are suspected in this area.

- Site No. 5, referred to as the "6000" Area Landfill, is located south of the Pavements and Grounds area of the base. A few interviewees indicated that old parts, batteries, and empty containers were dumped intermittently in this area from 1945 to 1965. Visual inspection of the site revealed a cleared area of approximately 3 acres covered with vegetation indicative of former disturbed soil conditions as may have resulted from a landfill operation. As with Site No. 4 above, no significant quantities of hazardous waste are suspected in this area.

- Site No. 6, referred to as the Sewage Plant Vicinity Landfill, was the main sanitary landfill for Tyndall AFB from 1965 to 1973, and is located behind the Sewage Treatment Plant. The site was also used intermittently after 1973 for disposal of construction rubble. Several of the interviewees indicated that unauthorized dumping of containers and drums containing waste oils and solvents occurred here in the past. Other materials buried here included wrecked drones and some asbestos encased in concrete. Since the total hazardous waste quantities generated from the industrial activities is small (Table 3), and landfill disposal was never the standard procedure for disposal of these wastes, this landfill is designated as a site where known small quantities of

hazardous wastes were disposed of in the past. Based on the types of industrial operations, these wastes may have included (unconfirmed) sealed containers of methyl ethyl ketone, paint residues and thinners, cresylic acid, o-dichlorobenzene, phenolic paint strippers, trichloroethylene, and chromic acid cleaning solutions.

- Site No. 7, referred to as the Spray Field Vicinity Landfill, was the main base sanitary landfill for Tyndall AFB from 1973 to 1977, and is located downgradient from the existing wastewater spray irrigation field. As with Site No. 6, this sanitary landfill was a trench/fill operation where the solid waste from the base was placed in excavated trenches and compacted. Some of the interviewees indicated that the trenches were often excavated below the ground-water table and that refuse was dumped into standing water. The compacted solid waste received a daily 6-inch cover of compacted soil from the excavation process. The final cap for the landfill totals 3-1/2 feet of soil and is planted with grass for erosion control. As with Site No. 6, several of the interviewees indicated that unauthorized dumping of containers and drums took place in the past. Since the total quantities of hazardous wastes generated from industrial activities at Tyndall AFB is small, this landfill is designated as a site where known small quantities of hazardous wastes were disposed of in the past. Based on the types of industrial operations, these wastes may have included (unconfirmed) sealed containers of methyl ethyl ketone, paint residue and thinners, cresylic acid, o-dichlorobenzene, trichloroethylene, tetrachloroethylene, and chromic acid cleaning solutions.

A ground tour of Sites 6 and 7 showed that these sites have been closed and are now covered with vegetation that is typical of the type of vegetation growing in disturbed soil conditions resulting from past landfill operations. Many small pine trees were also observed growing at Site No. 7. Both areas were fenced and posted with signs prohibiting dumping in these areas. Two drainage ditches run through these areas; one drainage ditch (referred to as Ditch No. 1) borders Site No. 7 at its southern extremity, while the other drainage ditch (referred to as Ditch No. 2) forms a boundary dividing Sites 6 and 7. Both drainage ditches flow into St. Andrew Sound. The ground tour was taken after a night of heavy rainfall. Visual inspection of Ditch No. 1 showed a small flow of water with good visual quality. The majority of this flow probably originated from runoff/percolation from the upgradient spray irrigation site. Visual inspection of Ditch No. 2 showed a much larger flow than in Ditch No. 1. The sides and bottom of Ditch No. 2 contained an orange/brown sediment, typical of iron or iron bacteria deposits resulting from landfill leachate. Visual quality of the water column itself was good. The orange/brown sediment was evident in the ditch along the entire extent of the landfill, and was absent in that portion of the ditch upgradient of the landfills, providing further indication of leachate migration from Sites 6 and 7 as the source of the orange/brown deposits. As discussed previously in Section B.10, "Available Water Quality Data," samples from Ditches No. 1 and 2 were taken in 1979 and analyzed for conventional parameters and heavy metals. Water quality was good; however, elevated iron levels were found in Ditch No. 2, again indicative of leachate from Sites 6 and 7. An organic scan was not included in the analyses.

- Site No. 8, referred to as the Golf Course Trash Disposal Site, has been used intermittently since 1962 for the disposal of yard

trash, tree limbs, and lawn clippings from the Golf Course. This site is located behind Building 3017 near the driving range. No known or suspected industrial wastes or hazardous wastes were disposed of at this site.

- Site No. 9, referred to as the Capehart Burial Site, was used to bury rubble and debris from the destruction of about 40 houses by a tornado in 1962. The housing debris was burned and then buried at this site. No known or suspected industrial or hazardous wastes were disposed of at this site.

- Site No. 10, referred to as Capehart Marina Rubble Storage, has been used since about 1975 for the aboveground storage of concrete rubble. This rubble is used to reinforce and build jetties at the Capehart Marina. No known or suspected industrial or hazardous wastes were disposed of at this site.

- Site No. 11, referred to as the Boy Scout Road Yard Trash Disposal Area, has been used since 1980 for the disposal of tree limbs and yard trash from the base. No known or suspected industrial or hazardous wastes are disposed of at this site.

- Site No. 12, referred to as the Highway 98 Burial Site, was used for the burial of rubble and debris from the razing of Magnolia and Tyndall housing during the mid-1960's. No known or suspected industrial or hazardous wastes were disposed of at this site.

- Site No. 13, referred to as the EOD Burial Site, has been used since the 1950's for the disposal of residue from the incineration or detonation of unused ordnance. The residue is inert and is checked thoroughly to ensure that no live ordnance remains. All hazardous constituents are destroyed in the incineration/ detonation operations, and no known or suspected hazardous materials are disposed of at this site.

- Site No. 14, referred to as the POL Area "A" Site, is located at the POL Area "A" Tank Farm near the Shoal Point Bayou barge unloading facilities. Small quantities of residues from tank sludge removal operations have been routinely disposed of in shallow trenches at this site since 1943. This procedure is considered to be an acceptable disposal method. Prior to 1974, however, leaded AVGAS was commonly stored at the POL Area "A" Tank Farm, and the residue from cleaning AVGAS storage tanks would have contained lead. By definition, leaded tank bottoms from sludge removal operations are considered to be RCRA hazardous wastes (EPA Hazardous Waste No. K052). Although the total waste quantities are believed to be small, the possibility does exist for leaching of lead from this site into the area ground water. No fuel saturation problems at this area are known or suspected.

- Site No. 15, referred to as the POL Area "B" Site, is located in the flightline area of the base near the Area "500" Tank Farm. The same concerns for lead migration into area

ground waters exist for Site No. 15 as for Site No. 14. Since the POL Area "B" Tank Farm is a much smaller operation, the total sludge quantities disposed of at this site would be much smaller than at Site No. 14. No fuel saturation problems of this area are known or suspected.

Currently, an independent contractor disposes of Tyndall AFB solid waste offsite at the Bay County Majette sanitary landfill. Sanitary landfill operations at Tyndall AFB have been discontinued since 1977. Current onsite disposal sites consist of the concrete rubble storage site located near the Capehart Marina (Site No. 10), and the yard trash disposal site located on Boy Scout Road (Site No. 11).

In addition to the 15 disposal sites identified above, two additional sites, i.e., old fire training areas, were included in the evaluation. These sites were included because they were the main repositories for POL waste from the industrial operations at Tyndall AFB in the past. As discussed previously in Section A.5 "Fire Training Activities," POL waste was transported to these areas and deposited in 20,000-gallon storage tanks. The POL waste was then sold to contractors or used in fire training exercises. Standard procedure for the fire training exercises was to pour POL waste onto an old aircraft or simulated aircraft located in a bermed area, and then set the aircraft on fire. Most of the POL waste was consumed in the fire; however, some minor percolation into the ground water may have taken place. Prior to 1971, a protein foam was used to put out the fires. Since then, fire-fighting agents known as Aqueous Film Forming Foams (AFFFs) have been used. AFFFs are non-corrosive and consist of fluorocarbon surfactants with petroleum base foam stabilizers. Small quantities of AFFFs may have percolated into the ground during fire-fighting exercises.

However, these agents are readily biodegradable under anaerobic conditions and are not considered to pose a potential for hazardous material contamination. It was also reported by one of the interviewees that the POL waste was sometimes taken to the fire training areas by flightline personnel and dumped into the bermed fire training area instead of into the POL waste storage tank. Therefore, additional quantities of POL wastes may have entered the ground water by this unauthorized practice, although the total quantities involved are believed to be small. The two old fire training areas are designated as follows:

- Site No. 16, referred to as the "Shell Bank" fire training area, was the original fire training area and was located northwest of the main instrument runway near Shoal Point Bayou. This site was used from 1943 to 1952; and again from 1968 to 1980.

- Site No. 17, referred to as the Highway 98 fire training area, was used from 1952 to 1968, and was located between the power check pads (Facility 84) and Highway 98. It was reported by one of the interviewees that 300 empty drums were crushed and buried approximately 300 feet east of this site in 1968. Standard procedure was to transport all empty drums to DPDO for salvage.

The two 20,000-gallon POL waste storage tanks from Site No. 17 were excavated and relocated to Site No. 16 in 1968. These tanks were subsequently removed in 1980, when the new Facility 21 was constructed, and sold for salvage through the DPDO.

Both sites were in operation during the time that the major industrial operations generating hazardous wastes were in existence. However, most of the waste POL in these areas were consumed in the fire training exercises. Therefore, the potential for hazardous material contamination at these sites is judged to be small.

2. Disposal Site Evaluation

Seventeen identified disposal sites were evaluated using a system for rating the hazard potential of waste disposal facilities. This system was developed by JRB Associates, Inc., of McLean, Virginia, for the U.S. Environmental Protection Agency, and was modified by CH2M HILL and Engineering-Science for specific application to the Air Force Installation Restoration Program.

The Air Force site rating system consists of 26 rating factors that are divided into 4 categories, i.e., receptors, pathways, waste characteristics, and waste management practices, which are used to evaluate the principal targets of contamination, the mechanisms for migration, the hazards posed by the contaminants, and the facility's design and operation, respectively. Relative scores from each category are combined to give an overall score using appropriate weighting factors. A more detailed description of this hazard evaluation methodology is included in Appendix I.

The following is a brief discussion of the results of the site assessments and description of general site characteristics in each of the four rating categories. Table 4 presents a summary of the the major characteristics of each disposal site.

Table 4
SUMMARY OF DISPOSAL SITE CHARACTERISTICS

Site No.	Site Description	Nearest Drinking Water Well (feet)	Nearest Surface Water Body (feet)	Name/Classification of Nearest Surface Water Body	Depth to Groundwater (feet)	Critical Environments	Evidence/Quantity of Hazardous Wastes	Waste/Hazardous Waste Types
1	Wherry	4,000	<500	East Bay/Class II	5-10	Adjacent to saltmarsh	None	General refuse and garbage
2	Sabre Drive	7,000	500	Pearl Bayou/ Class III	10-15	None	None	General refuse
3	Beacon Beach Road	8,000	2,000	St. Andrew Bay/ Class III	10-15	None	None	General refuse
4	SE Runway Extension	<500	5,000	East Bay/Class II	0-10	None	Suspected/small	Batteries, old parts, containers
5	"6000" Area	<500	1,500	East Bay/Class II	5-10	None	Suspected/small	Batteries, old parts, containers
6	Sewage Plant Vicinity	7,000	<500	St. Andrew Sound/ Class III	0-10	Adjacent to marsh & sea-grass areas	Known/small	Containerized waste oils, and solvents
7	Spray Field Vicinity	6,000	500	St. Andrew Sound/ Class III	0-10	Adjacent to marsh & sea-grass areas	Known/small	Containerized waste oils, and solvents
8	Golf Course	1,000	1,000	St. Andrew Bay/ Class III	5-10	None	None	Yard trash
9	Capehart	7,000	1,500	St. Andrew Bay/ Class III	5-10	None	None	Housing debris
10	Capehart Marina	9,000	<500	St. Andrew Bay/ Class III	0-5	Adjacent to seagrass area	None	Concrete rubble
11	Boy Scout Road	1,500	<1,000	Pearl Bayou/ Class III	5-10	None	None	Yard trash
12	Highway 98	4,500	2,000	St. Andrew Sound/ Class III	10-15	None	None	Housing debris
13	EOD	8,000	500	St. Andrew Sound/ Class III	0-5	None	None	Inert residue from EOD activities
14	POL Area "A"	<500	<500	Shoal Point Bayou/ Class II	0-5	None	Known/small	Sludge containing lead
15	POL Area "B"	8,000	5,500	Gulf of Mexico/ Class III	10-15	None	Suspected/small	Sludge containing lead
16	"Shell Bank" Fire Training	2,500	<500	Shoal Point Bayou/ Class II	0-5	None	None	Burning of POL waste
17	Highway 98 Fire Training	4,000	3,000	St. Andrew Sound/ Class III	10-15	None	None	Burning of POL wastes
--	Lynn Haven[a]	6,500	<500	North Bay/Class II	5-10	Adjacent to saltmarsh & seagrass area	Suspected/moderate	Sludge containing lead, Bunker C

a. Receptors: This category assesses the human population and critical environments which may potentially be affected by hazardous materials released from a waste disposal site.

Most of the identified sites are remote from populated areas and critical environments, but within a mile of the reservation boundary, i.e., one of the surrounding bays. The water quality designations of the bays are either Class II or Class III; Class II water bodies include East Bay on the north side of the base, while Class III water bodies include St. Andrew Bay, St. Andrew Sound, and the Gulf of Mexico on the south side of the base.

Sites that rated high in this category include Wherry (No. 1); Boy Scout Road (No. 11); POL Area "A" (No. 14) and "Shell Bank" Fire Training (No. 16) due primarily to the short distance from the sites to Class II waters, to critical environments, and/or to potable water supply wells. Wherry is also located adjacent to living quarters, giving it a high rating.

b. Pathways: This category assesses the potential routes and mechanisms by which hazardous materials can escape from a waste disposal site.

The potential for migration can be considered along two primary routes; vertically to potable water wells, or laterally to surface-water bodies. The potential for migration to water wells is generally low since (1) an aquiclude about 150 feet thick effectively separates the drinking water aquifer from the water table aquifer, (2) recharge to the drinking water aquifer does not occur locally, but originates in north Florida and south Alabama, and (3) potable wells are generally screened at depths over

200 feet so that low concentrations of pollutants would be considerably diluted during migration. The main base drinking water supply is obtained from Bay County, across East Bay, while less than one percent is obtained from supply wells on-base.

The potential for migration to surface waters is somewhat higher since (1) there is generally a high ground-water table and a high lateral permeability of the soil, and (2) the distance to the nearest surface waters is short. However, at most sites the slope of the water table, or the hydraulic gradient, is flat so that migration of contaminants would be relatively slow. An exception to this condition occurs at the landfills in the vicinity of the sewage plant and spray field (sites 6 and 7), where there is a significant hydraulic gradient.

The pathways category also rates the potential for migration based on the evidence and level of water or soil hazardous material contamination. Since no direct evidence of either type of hazardous material contamination was found during the records search, most sites received a low rating. Only the POL Areas "A" and "B" have been identified as having suspected soil contamination due to the burial of leaded AVGAS sludge.

c. Waste Characteristics: This category assesses the potential hazards posed by the waste materials present in a disposal site. The waste characteristics that are evaluated include the probable type and relative quantities of waste materials present as well as the degree of certainty as to their existence, whether known, suspected, or unknown. The potential for contaminant migration is low if no known quantities of hazardous materials are present, even if the site has receptors and pathways favorable to migration.

Most of the identified sites are closed domestic-type landfills that have no known or suspected hazardous wastes present. Small quantities of hazardous materials are suspected at the Southeast Runway Extension (Site No. 4), at the "6000" Area (Site No. 5), and POL area "B" (Site No. 14). Based on the interviews with present and former employees, small quantities are known to exist at the landfills in the vicinity of the sewage plant and spray field (sites 6 and 7) and POL Area "A" (Site No. 14). These sites have been assigned a higher rating.

d. Waste Management Practices: This category assesses the design characteristics and management practices at a given disposal site as they relate to the site's environmental impact. It also examines the measures that have been taken to minimize exposures to hazardous wastes.

None of the sites was a designated hazardous waste landfill. The sites do not have liners, leachate or gas collection systems, impervious covers, or accurate records. At the landfills in the vicinity of the sewage plant and spray field (sites 6 and 7) the landfill materials were reportedly placed in standing water. Hence, the bottoms of these landfills are submerged.

The impact of these management practices is minimized, however, by the relatively small quantities of hazardous wastes and total wastes disposed of at these sites.

Copies of the rating forms completed for each site are included in Appendix J. A summary of the results of the site assessments, using the Air Force rating system, is given in Table 5. Photographs of some of the sites are included in Appendix K.

Table 5
SUMMARY OF RESULTS OF SITE ASSESSMENTS

Site No.	Site Description (Weighting Factor):	Subscores (% of Maximum Possible Score in Each Category) Receptors 0.22	Pathways 0.30	Waste Characteristics 0.24	Waste Management Practice 0.24	Overall Score (Weighted Average)	Page Reference of Site Rating Form
1	Wherry	74	37	30	55	48	J-1
2	Sabre Drive	30	32	30	55	37	J-3
3	Beacon Beach Road	26	30	30	55	35	J-5
4	SE Runway Extension	49	29	50	37	41	J-7
5	"6000" Area	53	33	50	53	46	J-9
6	Sewage Plant Vicinity	49	35	60	60	50	J-11
7	Spray Field Vicinity	49	38	60	67	53	J-13
8	Golf Course	49	33	30	31	36	J-15
9	Capehart	35	33	30	38	34	J-17
10	Capehart Marina	52	35	30	31	37	J-19
11	Boy Scout Road	58	33	30	31	38	J-21
12	Highway 98	37	28	30	38	33	J-23
13	EOD	30	33	40	38	35	J-25
14	POL Area "A"	58	39	60	44	50	J-27
15	POL Area "B"	44	30	50	38	40	J-29
16	"Shell Bank" Fire Training	58	35	30	38	40	J-31
17	Highway 98 Fire Training	37	28	30	31	31	J-33
--	Lynn Haven DFSP	54	38	70	49	52	J-35

V. OFF-BASE INSTALLATIONS

V. OFF-BASE INSTALLATIONS

Tyndall AFB owns or leases seven properties off-base that are used in support of base operations. These installations are located in Carrabelle, St. George Island, Apalachicola, Springfield, Cove Gardens, and Lynn Haven as shown on Figure 1, Page II-1. In addition, the Bay County Wastewater Treatment Lagoon is included since it is located on Tyndall AFB land which has been leased to Bay County.

A cursory review of the activities and past hazardous waste disposal practices at each facility was made in conjunction with the Tyndall AFB records search. Information was obtained through discussions with individuals familiar with each installation. Ground visits were made to Cove Gardens, Lynn Haven, and the Bay County Lagoon.

A. Carrabelle Missile Tracking Annex

The Carrabelle facility is located on about 36.3 acres of land that has been leased from the Western Star Milling Company since 1959. The property occupies a small peninsula separating the Carrabelle River from St. George Sound.

The installation is an antenna site for MATTS and ACMI tracking systems. Operations continue 24 hours per day, requiring five personnel, two of whom are employees of RCA, a private Contractor. No hazardous wastes are handled or disposed of at the facility. There are also no reported landfills or burial sites on the property. Sanitary wastewater is disposed of onsite in septic tanks.

B. St. George Island ACMI Tower

This remote installation on the north side of St. George Island occupies about 0.34 acre and has served as an ACMI receiving station since 1979. Batteries containing

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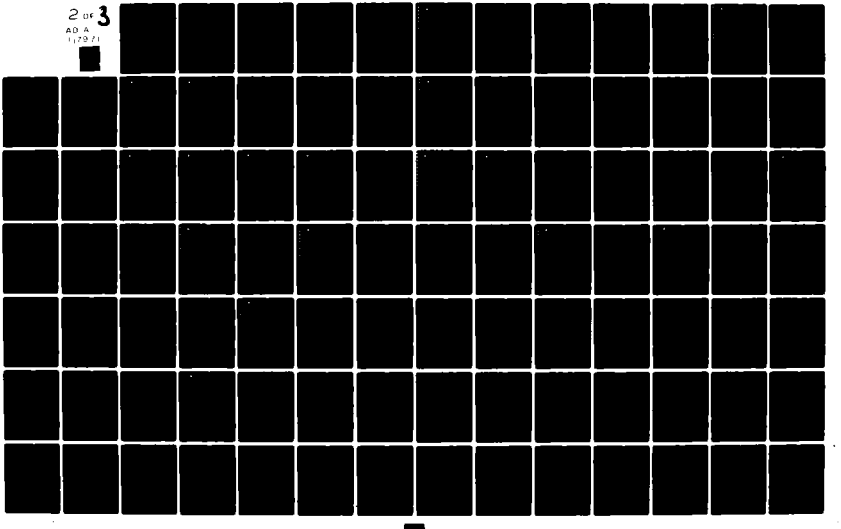

acids are present for use as a back-up power supply. No known or suspected hazardous wastes have been handled or disposed of at this site.

C. Apalachicola Radio Relay Annex

The Apalachicola installation is an unmanned relay station for MATTS acquired in 1959. The facility is located north of U.S. Highway 98 near the Apalachicola Water Plant and covers about 6.88 acres. No known or suspected hazardous wastes have been handled or disposed of at this site.

D. Springfield Railroad Siding Annex

The Springfield annex is located between Panama City and Tyndall AFB near the junction of U.S. Highway 98 and the Atlanta and St. Andrew Bay railroad tracks. The railyard consists of approximately 7.55 acres and includes both an endloading and a sideloading ramp. A small office building, which previously occupied a corner of the site, has recently been torn down. The facility has been used since 1941 for unloading railcar shipments bound for Tyndall AFB, generally consisting of inert construction materials. The site is used very little now, averaging about 25 railcar loads per year. No known or suspected hazardous wastes have been handled or disposed of at this site.

E. Cove Gardens Military Family Housing Satellite

Located adjacent to St. Andrews Bay near downtown Panama City, Cove Gardens contains 130 four-bedroom housing units on 33.07 acres of land. The units were originally purchased in 1942 for use as officers' quarters. Water, wastewater, and solid waste disposal services are provided directly by the City of Panama City. No known or suspected hazardous wastes have been handled or disposed of at this site.

F. Bay County Wastewater Treatment Lagoon

In 1973, the Bay County Commissioners leased 150 acres of Tyndall AFB property at Military Point for construction of a wastewater facility. The 32-mgd aerated lagoon treatment facility, owned and operated by Bay County, began treatment of Southwest Forest Products papermill waste in August 1974. The facility has been designated as a regional treatment plant and will begin treating primary domestic effluent from several communities next year, including Callaway, Cedar Grove, Parker, Springfield, Melville, and Bay County. Tyndall AFB plans to send all of its wastewater to the regional facility in 1984, at which time the main base treatment plant and spray field will cease operation. At full design capacity, the regional facility will treat 24 mgd of industrial wastewater and 8 mgd of domestic wastewater.

Sludge from the lagoon bottom was dredged for the first time last winter and stored in three holding ponds adjacent to the lagoon for dewatering. Supernatant from the holding ponds is sent back to the lagoon for treatment. The sludge has been tested by Bay County using the EP toxicity procedure and found to be non-hazardous. The final disposition of the dewatered sludge has not yet been determined, but it will probably be hauled offsite to a sanitary landfill. It is anticipated that the sludge dredging operation will be required every 4 to 5 years.

G. Lynn Haven Defense Fuels Supply Point

Located on 203.44 acres next to North Bay, the Lynn Haven facility has been used as a bulk fuels storage and dispensing terminal since 1943. Although the property is owned by Tyndall AFB, the facility was acquired by the Defense Fuel Supply Center in 1973 and is operated by a

private contractor. Originally, the facility was operated by the Navy for storage of Bunker C fuel. The fuel was unloaded from tankers moored at four docks at the north end of the site and stored in the 10 steel tanks which are still present at the facility. The fuel was then transferred to railroad tank cars for shipment throughout Florida and the Southeast. A railcar maintenance facility was located in the southeast corner of the site, but was demolished in the early 1950's; only the floor slab remains.

A drum loading station was originally present south of the railcar loading area, and was used for loading drums filled with Bunker C fuel onto trucks for shipment. Steam, which was generated at that time for increasing the fluidity of the Bunker C fuel, was also used for cleaning waste drums. The steam-cleaned oil was routinely dumped on the ground behind the drum loading station, evidence of which can still be seen.

In the early 1950's, Bunker C fuel was phased out of use. One of the interviewees reported that when the Bunker C fuel became obsolete, the fuel remaining in the bulk storage tanks was pumped out on the ground outside of the west gate. Moderate quantities may have been disposed of in this way. A thin layer of black, weathered sludge was observed in shallow pits in that area during a ground tour of the facility. A few abandoned drums and used fuel filter cartridges among other trash was also noted. Most of the area, approximately one acre in size, is covered with vegetation indicative of former disturbed soil conditions which may have resulted from a landfill operation.

Some distressed willow trees were observed growing in the waste disposal pits. Other plant growth was sparse, although this visible vegetational effect was very minor.

Since the 1950's, AVGAS, JP-4, and JP-5 have been the primary fuels stored at the facility. Prior to 1969, it was common practice to bury tank sludges within the diked areas surrounding the storage tanks. The bottoms of the dike areas are extremly permeable, consisting of a sand base with a gravel cover. Locations and quantities of buried material were not recorded, and the wastes were not characterized. Some of the sludge was from leaded fuel. Leachate migration has reportedly not been observed or monitored, and most of the buried material is believed to have been removed during regrading and resurfacing of the terminal grounds.

Reports of minor spills have been common. Periodically, the tanks are overtopped, spilling approximately 5,000 gallons every 1 or 2 years. Minor spills have also occurred at the existing truck loading station and the railcar loading area. Measures to mitigate the effects of spills were undertaken in the late 1970's. An underdrain field was installed in 1980 beneath the railcar loading area as a spill mitigation measure. The underdrains, which discharge to a series of oil/water separators, have collected Bunker C fuel from the ground water underlying the railcar loading area.

The facility currently operates six oil/water separators and has an existing NPDES permit for six stormwater discharges to North Bay. These discharges are routinely sampled and analyzed for oil and grease, suspended solids, BOD, pH, lead, and chromium. No unacceptable discharges have been reported.

The Lynn Haven DFSP site was evaluated using the site rating system described in Appendix I. The results of the site rating are given on pages J-35 and J-36. A summary of the rating scores in the receptors, pathways, waste characteristics, and waste management practices categories is given below.

Receptors. The Lynn Haven facility is located in an industrial land use zone within the City of Lynn Haven; there is no population within 1,000 feet. The facility is adjacent to a natural wetlands area and borders North Bay, a Class II water body. The nearest potable water wells are located in the City of Lynn Haven, approximately 1.25 miles from the facility.

Pathways. The mechanisms for ground-water and contaminant migration at Lynn Haven DFSP are similar to those at Tyndall AFB, including a high ground-water table, permeable soil and rock conditions, and close proximity to surface waters. No direct evidence of water contamination was found at Lynn Haven DFSP, although soil contamination is suspected due to the reported past burial of leaded AVGAS sludge and disposal of Bunker C fuel.

Waste Characteristics and Management Practices. Moderate quantities of Bunker C fuel have been reportedly disposed of outside of the west gate; significant quantities have been obtained in the oil/water separator installed in conjunction with the spill mitigation measures constructed in 1980. Although Bunker C fuel is not, by definition, an ignitable hazardous waste, the potential for contamination of nearby surface water is still a concern. In addition, known moderate quantities of leaded AVGAS sludge have been buried at the facility since 1943.

VI. CONCLUSIONS

VI. CONCLUSIONS

A. No direct evidence indicates migration of hazardous contamination beyond Tyndall AFB properties.

B. Evidence obtained through interviews with past and present base personnel indicates that small quantities of hazardous wastes, primarily waste solvents, have been disposed of in landfill operations in the past.

C. A potential exists for migration of pollutants due to a high water table and permeable soil conditions. The potential for migration beyond base property is low at most of the identified sites due to low hydraulic gradient, with the exception of Sites 6 and 7.

D. Table 6 provides a listing of the 17 identified sites and their overall rating scores. Although no high priority sites were identified, the following sites were identified as areas showing the most significant potential (relative to other sites) for contaminant migration.

1. Sites 6 and 7 (Sewage Plant Vicinity Landfill, 1967-1973, Spray Field Vicinity Landfill, 1973-1977) due primarily to:

   - Proximity to St. Andrew Sound.
   - Evidence of leachate migration in a main drainage ditch running through these sites. This ditch discharges to St. Andrew Sound.
   - Location of a treated wastewater effluent spray irrigation site adjacent to and upgradient from Site No. 7. This increases the potential for leachate migration from Site No. 7.

Table 6
PRIORITY LISTING OF DISPOSAL SITES

Medium Priority Site No.	Site Description	Overall Score
7	Spray Field Vicinity Landfill	53
--	Lynn Haven DFSP	52
6	Sewage Plant Vicinity Landfill	50
14	POL Area "A" Fuel Supply	50

Low Priority Site No.	Site Description	Overall Score
1	Wherry Landfill	48
5	"6000" Area Landfill	46
4	SE Runway Extension Burial Site	41
15	POL Area "B" Fuel Supply	40
16	"Shell Bank" Fire Training Area	40
11	Boy Scout Road Yard Trash Disposal	38
2	Sabre Drive Landfill	37
10	Capehart Marina Rubble Storage	37
8	Golf Course Trash Disposal	36
3	Beacon Beach Road Landfill	35
13	EOD Burial Site	35
9	Capehart Burial Site	34
12	Highway 98 Burial Site	33
17	Highway 98 Fire Training Area	31

- o Permeable soil conditions.

- o High hydraulic gradient as evidenced by slope of water table toward St. Andrew Sound.

- o Known small quantities of hazardous wastes, including waste oils and solvents, that were sent to these landfills in the past.

2. Site 14 (Sludge Disposal from POL Area "A" Tank Farm) due primarily to:

   - o Proximity to potable water supply wells.

   - o Proximity to Shoal Point Bayou.

   - o Permeable soil conditions.

   - o Known past disposal of sludge from leaded AVGAS storage tanks.

3. Sites 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 15, 16, and 17 are not considered to pose a hazard for migration of contaminants. Therefore, these sites do not warrant additional study.

E. The records search at the off-base installations was intended as a cursory look at past hazardous waste practices. No direct evidence of hazardous contaminant migration from any of the 7 sites is apparent. The sites at Carrabelle, St. George Island, Apalachicola, Springfield, and Cove Gardens, and the Bay County Lagoon are not considered to pose a hazard and do not warrant additional study.

F. At the Lynn Haven DFSP, a potential exists for migration of hazardous contaminants due primarily to:

- o Proximity to North Bay.
- o Permeable soil conditions.
- o High water table.
- o Reported burial of leaded AVGAS tank sludge.
- o Evidence of Bunker C fuel in ground water underlying the railcar unloading area and alleged disposal of moderate quantities of Bunker C fuel outside of the west gate.

VII. RECOMMENDATIONS

VII. RECOMMENDATIONS

To verify that hazardous contaminant migration is not a problem at Sites 6, 7, and 14 and at Lynn Haven DFSP a limited Phase II program is advisable. The recommended program includes the following:

A. Sites 6 and 7 were the main base landfill sites from 1965 to 1977. These sites exhibit evidence of significant leachate migration in a southwesterly direction toward St. Andrew Sound. Limited water quality sampling is recommended to determine if hazardous contaminants are present in this leachate. The suggested program includes:

1. Installation of a total of three downgradient monitoring wells: one well southwest of Site No. 6, and two wells southwest of Site No. 7.

2. The wells should be constructed to a total depth of approximately 15 feet and screened approximately 5 feet above and below the normal water table.

3. Collection of a water sample and a sediment sample from the drainage ditch separating Sites 6 and 7. The samples should be taken approximately 200 feet upstream from the drainage ditch discharge point into St. Andrew Sound.

4. Existing spray field monitoring well No. 8 should be sampled to give baseline upgradient ground-water quality data.

B. The above wells and drainage ditch should be sampled at least once and analyzed for the following:

Parameter	Reason
pH, COD, TOC, oil and grease	Indicators of nonspecific gross contamination
Phenol, volatile organic compounds including trichloro-ethylene, o-dichloro-benzene, and methyl ethyl ketone	Indicators of specific hazardous wastes generated at Tyndall AFB.
DDT	Common pesticide used in large quantities on-base in the past.
Lead, chromium (total and hexavalent), nickel, cadmium, mercury	Possible contaminants from waste batteries and waste cleaning solutions
Iron	Indicator of landfill leachate

C. It is recommended that the monitoring wells continue to be sampled periodically, every 1 to 2 years, to determine the potential for long-term contaminant migration.

D. At Site 14 (POL Area "A"), it is recommended that a backhoe test pit, approximately 20 feet long, be excavated to a depth about 2 feet below the water table. The location of the test pit should be approximately 20 feet beyond the north fence perimeter of the tank farm and parallel to the fence. A water sample should be collected

from the test pit and analyzed for lead, COD, and oil and grease. The test pit should be visually inspected for soil characteristics and evidence of fuel saturation or stratification.

E. At Lynn Haven DFSP, one monitoring well should be installed east of the tank area perimeter dike, two wells should be installed north of the diked area, and one well should be installed north of the suspected disposal area outside of the west gate. In addition, one well should be installed south of the railcar loading area. Each well should be installed to a depth of 15 feet and screened for a length approximately 5 feet above and below the normal water table. Water samples should be analyzed for oil and grease, COD, and lead.

Details of the program outlined above, including the exact location of sampling points, should be finalized as part of the Phase II program. Since no imminent hazard has been determined, there is no immediate urgency to conduct the above program, which can be implemented as financial resources become available.

It is not the intent of this program to assess the depth or location of any contaminated plume or the direction or rate of movement of such a plume. In the event that contaminants are detected during visual inspection of the test pit or in the water samples collected from any of the wells, a more extensive field survey program should be implemented to determine the extent of the contaminant migration. The Phase II contractor should be responsible for evaluating the results of the program outlined above and for recommending additional monitoring, as appropriate.

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REFERENCES

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Appendix A
RESUMES OF TEAM MEMBERS

NORMAN N. HATCH, JR.

Industrial Wastewater and Hazardous Waste Projects Manager

Education

M.S., Environmental Engineering, University of Florida, 1973
M.S., Analytical Chemistry, University of Florida, 1972
B.S., Chemistry, University of New Hampshire, 1969

Experience

Mr. Hatch joined CH2M HILL in 1973 and is currently the Manager of the Industrial Wastewater Reclamation Department. His range of engineering experience includes hazardous waste projects, laboratory and pilot treatability studies, process design of industrial wastewater treatment facilities, and process design of municipal water and wastewater treatment facilities. Examples of his work include:

- Overall responsibility for hazardous materials disposal site records searches for 12 U.S. Air Force installations throughout the United States. The purpose of the records searches is to assess the potential for hazardous contaminant migration from past disposal practices and to recommend follow-up actions.

- Assistance in a comprehensive RCRA compliance program for Gulf Oil Company's Port Arthur Refinery.

- Project manager of a feasibility study for treatment of high nitrogen industrial wastewater from the Air Products and Chemicals, Inc., manufacturing facility in Pensacola, Florida. Treatment technologies investigated included aerated lagoons, oxidation ponds, anaerobic treatment ponds, spray irrigation, activated carbon, and air stripping.

- Project manager of a comprehensive treatability and process selection study for the American Cyanamid Fibers Division plant in Milton, Florida. Investigations included spray irrigation, deep well injection, activated sludge, rotating biological contactors, anerobic contact treatment, activated carbon, ion exhange, and chemical coagulation.

- Project manager for several other treatability and process selection studies for industrial clients including Arizona Chemical Company, Kaiser Agricultural Chemicals, Engelhard Industries, and Production Plating Company.

- Assistance in the negotiation of NPDES permits for Air Products and Chemicals, Inc., American Cyanamid, and Kaiser Agricultural Chemicals.

- Lead engineer on an ozone disinfection feasibility study for the City of Philadelphia's Queen Lane Water Treatment Plant. Also served as chief process engineer for the subsequent design of chemical feed systems at the Queen Lane Plant.

NORMAN N. HATCH, JR.

- Process design and design of chemical feed and sludge handling facilities for the Alexander City, Alabama, Water Treatment Plant.
- Process design and design of chemical feed system modifications for the St. Augustine, Florida, Water Treatment Plant.
- Project manager for the design of water treatment facilities, including lime softening, zeolite softening, and granular activated carbon adsorption for a sugar mill in south Florida.
- Project manager for development of a comprehensive water system master plan, including raw water supply, treatment, and distribution systems for the Fort Pierce Utilities Authority, Fort Pierce, Florida.
- Project manager for a feasibility study of direct wastewater reuse for potable water for the City of St. Petersburg, Florida.
- Project manager for the planning, supervision, and performance of pilot plant investigations for the removal of hydrogen sulfide from potable water for the Orlando Utilities Commission, Orlando, Florida.
- Cost-effective analysis and process selection for treatment of combined domestic and paper mill wastewater for the City of Harriman, Tennessee.
- Preparation of various segments of 201 facilities plans for Monroe County (Florida Keys); Lake City, Florida; Alachua County, Florida; Puerto Rico; and Live Oak, Florida.

Before joining CH2M HILL, Mr. Hatch was employed with the E.I. du Pont de Nemours Photo Products Plant in Parlin, New Jersey.

Membership in Organizations

Phi Beta Kappa
Phi Kappa Phi
Society of the Sigma Xi
Water Pollution Control Federation

Professional Engineer Registration

Florida
Georgia

BRUCE JAMES HAAS

Manager, Geotechnical Engineering

Education

M.S., Civil Engineering, University of Wisconsin, 1976
B.S., Civil Engineering, University of Wisconsin, 1975
Studies as exchange student, Technische Universitat,
Munich, West Germany, 1974-1975

Experience

Mr. Haas is responsible for field explorations and geotechnical investigations and for general earthwork design projects. His special knowledge of soils, sitework, and construction procedures has been instrumental in developing numerous efficient and economical civil engineering designs. Project experience includes site development, grading and drainage, streets and roadways, marinas, and hazardous waste disposal. Examples of project-related assignments include:

- Lead civil engineer in charge of stormwater management, site development, and geotechnical review for the new 130-mgd West County Wastewater Treatment Plant for the Louisville and Jefferson County Metropolitan Sewage District, Louisville, Kentucky.

- Geotechnical engineer responsible for geohydrologic reviews of various hazardous waste disposal facilities for the Agrico Chemical Company. The project involved assessment of ground-water pollution potential, design of monitoring systems, and preparation of closure and post-closure plans for agricultural chemical plants in Oklahoma, Louisiana, and Florida.

- Design geotechnical engineer and resident inspector for a 6-mgd wastewater treatment plant for the Grand Strand Water and Sewer Authority, Conway, South Carolina. Plant facilities and the 3,000-foot-long effluent pipeline were supported by timber piles.

- Civil and geotechnical engineer for marina improvements at the Oyster Water-Based Recreation Facility located in the tidal marshes of Northampton County, Virginia.

- Resident inspector for stabilization and reconstruction of existing sludge lagoon dikes for the Madison, Wisconsin, Metropolitan Sewerage District. This project involved the use of fabric reinforcement and light-weight wood chip fill for dikes located on highly compressible, low-strength marsh deposits.

Mr. Haas has performed foundation investigations and geotechnical designs for numerous major water and wastewater treatment plants at the following locations:

- Walt Disney World, Florida

- St. Petersburg, Florida

BRUCE JAMES HAAS

- Suffolk, Virginia
- Howard County, Maryland
- Harriman, Tennessee

These investigations have resulted in safe, economical design of foundation systems involving spread footings, piles, and construction preloads.

Professional Engineer Registration

Florida, Wisconsin

Membership in Organizations

American Society of Civil Engineers

Publications

"Proposed Criteria for Interpreting Stability of Lakeshore Bluffs," Engineering Geology, 1980, with T. B. Edil.

STEPHEN J. HAHN
Division Manager, Civil Engineering

Education

M.S., Civil Engineering, University of Illinois, 1974
B.S., Civil Engineering, University of Illinois, 1973

Experience

Mr. Hahn serves as project manager for the design of dams, marinas, and port facilities. He is also responsible for geotechnical investigations and analyses for foundations, embankments, excavations, retaining structures, ponds, pipelines, and roads. His project-related responsibilities have included:

Geotechnical Engineering:

- Investigations and foundation recommendations for wastewater treatment plants in Harriman, Tennessee; Charlotte, North Carolina; Waycross, Georgia; Port Angeles, Washington; and St. Petersburg, Florida.
- Investigations and foundation recommendations for water treatment plants in Naples, Florida; Alexander City, Alabama; Trinidad, West Indies; and Colorado Springs, Colorado.
- Investigations and foundation recommendations for numerous swimming pools, water reservoirs, ponds, school and office buildings, industrial plant facilities, pipelines, pump stations, transmission towers, and sea walls.
- Geotechnical site feasibility studies for a 20-MW diesel engine power plant near Sebring, Florida.
- Construction monitoring and dewatering systems evaluation for deep excavations in St. Petersburg, Florida; Miami, Florida; and Greece, New York.

Dams:

- Project management for the design and construction of post-tensioned steel anchors and concrete repairs for a 30-foot-high concrete gravity dam in Habersham, Georgia.
- Geotechnical investigations and preliminary designs for three earthfill dams in Williamsburg, Virginia.
- Hydrologic investigations and slope stability analyses for design of a 120-foot-high embankment dam for the ARCO shale oil project near Rifle, Colorado.

STEPHEN J. HAHN

- Independent review of construction plans for the W.R. Grace waste clay storage dams in Manatee County, Florida.
- Independent review of construction plans for Lake Newport Dam, Reston, Virginia.
- Preparation of operations, maintenance and inspection plans for Lake Anne Dam, Reston, Virginia.

Membrane-Lined Ponds:

- Project management for the design of PVC-lined industrial ponds in Dallesport, Washington, and Colorado Springs, Colorado.
- Resident inspection for construction of a 10-million-gallon, Hypalon-lined in Eugene, Oregon.
- Investigation of the failure of a Hypalon-lined polishing pond in Live Oak, Florida.

Ports and Marinas:

- Project management for the design of a new 25-slip boat marina for Northampton County, Virginia. Project included a precast concrete floating dock moorage system, comfort station and harbor-master's office, a four-lane launching ramp with two courtesy docks, parking lot, boat pump-out facilities, sanitary waste disposal system, and potable water supply system.
- Project management for the design of a new precast concrete sea wall at the City Yacht Basin in Ft. Pierce, Florida.
- Design of steel pipe piles and prestressed concrete piles, including lateral pile load tests for the Municipal Yacht Pier in St. Augustine, Florida.
- Geotechnical investigations for landfills and piles for a containerized-cargo unloading facility for the Port of Seattle, Washington.

While a graduate student, Mr. Hahn investigated innovative support systems for rapid transit tunneling. He devoted considerable research to the material properties of pneumatically applied concrete.

Professional Engineer Registrations

Florida, Georgia, Maryland, North Carolina, Virginia

ROBERT L. KNIGHT
Ecologist

Education

B.A., Zoology, University of North Carolina, 1970
M.S.P.H., Environmental Chemistry and Biology, University of North Carolina, 1973
Ph.D., Systems Ecology, University of Florida, 1980

Experience

Dr. Knight's responsibilities at CH2M HILL involve all aspects of environmental study, including design and implementation of field studies, data analysis and interpretation, project management, environmental systems overview analysis, impact analysis, prediction, and assessment. His experience has covered a wide range of applied research problems in aquatic and terrestrial environments, including computer simulation analyses. Representative experience includes the following:

- Crystal River Power Plant Study—Managed and participated in field study of Florida Power's nuclear power plant on the Crystal River estuary. Studied effects of plant operation on ecosystem metabolism.

- Heavy Metal Toxicity Studies—Aided with design and implementation of long-term studies of fate and effects of cadmium and mercury at low levels in stream microcosms. Prepared toxicity simulation model for cadmium and developed general quantification techniques of toxicity in biological systems.

- Environmental Systems Overview Analysis—Prepared and simulated quantitative overview models for Coosa River EIS and for Indian River Power Plant impacts.

- Silver Springs Study—Performed extensive field work at Silver Springs, Florida, to investigate the relationship between plant productivity and consumer organisms. Developed new microcosm design for study of flowing aquatic systems.

- Salt Marsh Study—Participated in team study of application of treated sewage effluent to *Spartina* marsh at Morehead City, North Carolina.

- Phytoplankton Research—Performed field verification studies of Algal Assay Procedure. Studied effects of power plant entrainment on phytoplankton numbers and diversity.

Publications

"In Defense of Ecosystems," (Coauthor D. Swaney). *American Naturalist*, 117:991-992, 1981.

ROBERT L. KNIGHT

"A Control Hypothesis for Ecosystems, Energetics and Quantification." Paper presented at the Energy and Ecological Modelling Symposium, ISEM, Louisville, Kentucky. 1981.

Energy Basis of Control in Aquatic Ecosystems. Ph.D. Dissertation, University of Florida. 1980.

Energy Model of a Cadmium Stream with Correlation of Embodied Energy and Toxicity Effect. Final Report to EPA on Contract EPA R-806080. 1980.

Fate and Biological Effects of Mercury Introduced into Artificial Streams. (Coauthors H. J. Kania and and R. J. Beyers). EPA-600/3-76-060. U.S. EPA, Athens, Georgia. 1976.

Effects of Entrainment and Thermal Shock on Phytoplankton Numbers and Diversity. Department of Environmental Sciences and Engineering, Publication 336, University of North Carolina, Chapel Hill. 1973.

Appendix B
OUTSIDE AGENCY CONTACT LIST

Appendix B
OUTSIDE AGENCY CONTACT LIST

1. Bay County Health Department, Panama City, Florida, Mr. Douglas Kent, 904/769-3471.

2. Florida Department of Environmental Regulation Northwest Florida Subdistrict Office, Pensacola, Florida, Mr. Tim Sparks and Mr. John Kintz, 904/436-8360.

3. Florida Department of Environmental Regulation Sub-Regional Office, Panama City, Florida, Mr. Larry Taylor, 904/769-3576.

4. Environmental Protection Agency Region IV, Atlanta, Georgia, Mr. Art Linton, 404/881-2211.

5. Bay County Water and Wastewater Department, Panama City, Florida, Mr. George Cook, 904/785-6106.

6. Bay County Environmental and Public Services, Panama City, Florida, 904/785-6446.

7. U.S. Department of Agriculture, Soil Conservation Service, Panama City, Florida, 904/785-9500.

8. U.S. Fish and Wildlife Service, Division of Ecological Services, Panama City, Florida; Mr. Jay Traxle, 904/769-0552.

9. Naval Coastal Systems Center, Panama City, Florida, Dr. Horris Loften, 904/234-4183.

10. National Marine Fisheries Service, Southeast Fisheries Service, Panama City, Florida, Dr. Gene Nakamura, 904/234-6541.

11. National Marine Fisheries Service, Environmental Assessment Branch, Panama City, Florida, Mr. Mark Thompson, 904/234-5061.

12. Florida Game and Freshwater Fish Commission, Panama City, Florida, Mr. Bill Bartush, 904/256-3676.

13. Florida Department of Natural Resources, Bureau of Geology, Tallahassee, Florida, 904/488-4191.

Appendix C
TYNDALL AFB RECORDS SEARCH INTERVIEW LIST

Appendix C
TYNDALL AFB RECORDS SEARCH INTERVIEW LIST

Interviewee	Areas of Knowledge	Years at Installation
1.	Civil Engineering	17
2.	Civil Engineering	35
3.	Fire Department	33
4.	Real Property	17
5.	Engine Shop Mechanic	21
6.	Explosive Ordnance Disposal	6
7.	Watercraft	16
8.	Aerospace Ground Equipment	6
9.	Pneudraulics Shop	9
10.	Judge Advocate Office	2
11.	Weapons Safety	6
12.	Fire Safety	13
13.	Bioenvironmental Engineering	2
14.	Bioenvironmental Engineering; Fuels System Mechanic	8
15.	Environmental Coordinator	5
16.	Corrosion Control	5
17.	Corrosion Control	4
18.	Operations	10
19.	Structural Engineering; Housing Maintenance	9
20.	Base Forestry	21
21.	Base Forestry	10
22.	Exterior Electric	16
23.	Entomology; Forestry; Pavements and Grounds	7
24.	Fuels	16
25.	Water and Wastewater	17
26.	Engine Shop; Packing and Crating	11
27.	Battery Shop	26
28.	Golf Course Maintenance	2
29.	Defense Property Disposal Office	8
30.	Explosives Safety	5
31.	AFESC Environmental Labs	3
32.	Defense Fuels Agency (Lynn Haven)	3
33.	AFESC Field Technology	8
34.	AFESC Pavements Lab	8
35.	Defense Fuels Agency (Lynn Haven)	12

Appendix D
INSTALLATION HISTORY

Appendix D
INSTALLATION HISTORY

On December 8, 1941, the date that President Roosevelt asked Congress to declare war, Tyndall Field officially opened in a corner of northwest Florida on the Gulf of Mexico. The installation was named for Lieutenant Frank B. Tyndall, a native of Florida, who was killed in the line of duty when his aircraft crashed near Moorsville, North Carolina, on July 15, 1930. Lieutenant Tyndall was a World War I flying ace in the Army Air Corps, officially credited with four victories over German flyers.

Tyndall Field became the center of the Army Air Corps' first flexible gunnery school, which trained thousands of aerial gunners between 1942 and 1945. Its first mission was to train instructors for the gunnery school. This was accomplished in 2 months, with the new instructors holding their first classes in February 1942. For air-to-air training, students flew in AT-6 training planes and fired machine guns from the rear cockpit at sleeve-type targets towed by other airplanes.

When World War II ended in 1945, Tyndall Field operated briefly on a standby status. In May 1946, it became the home of the Air University's Air Tactical School, training junior officers in the responsibilities of command at squadron level. The name of the installation was changed to Tyndall Air Force Base in 1947 when the Air Force became a separate branch of military service. In 1950, the base was transferred to the Air Training Command and became responsible for training all-weather jet interceptor pilots (F-86D) and aircraft controllers. The aircraft controller school remains an important part of the activities at the base, training hundreds of personnel to man radar scopes at aircraft control and warning stations around the world.

The base was transferred from the Air Training Command to the Air Defense Command in July 1957, when the F-86D interceptor school was tranferred to Moody AFB, Georgia. At that time, Tyndall AFB's mission shifted to that of a weapons center. Its mission included four major areas: (1) weapons training and system evaluation; (2) testing of methods, tactics, techniques, and equipment; (3) tactical air defense; and (4) administering, equipping, training, and preparing subordinate units to accomplish their missions, in addition to providing support for all attached units in accordance with established Air Defense Command policies.

Tyndall's role as a weapons center was broadened in 1962 with the assignment of a new mission for aircrew transition training for F-101 and F-106 pilots. To fulfill this new mission, the 4756th Air Defense Wing was activated. This was the result of a new Air Defense Command training mission, which gave the command the responsibility of providing combat training for its own interceptor aircrews, a task previously accomplished by the Air Training Command.

The Air Defense Weapons Center was activated on January 1, 1968 to provide a single area within the Department of Defense for the centralization of operational and technical expertise on air defense matters.

A new dimension to air defense weapons training was added to the Weapons Center's program on July 15, 1974, when the 62nd Fighter Interceptor Training Squadron/USAF Interceptor Weapons School conducted its first F-4 Air Defense Employment Course. This training was part of Project Worldwide Air Defense Enhancement, a program designed to significantly improve the air defense capabilities of aircrews assigned to the Tactical Air Command, Alaskan Air Command, Air Forces Iceland, Pacific Air Force, and USAF-Europe.

On February 7, 1975, the Air Defense Weapons Center assumed responsibility for the PQM-102 program. This program is designed to convert surplus F-102 aircraft into pilotless targets or "drones" that will accurately and economically simulate the fighter aircraft threat. The first unmanned operational flight of the PQM-102 was flown on June 25, 1975 against an F-15. The drone program at Tyndall AFB is currently operated by an RCA subsidiary under contract to the Air Force. The contract consists of operating and maintaining the BQM-34 (subscale) and PQM-102 (full-scale) drones, launch and support facilities, scoring systems, and various tow targets. Tests are now underway with the F-100 fighter, which will be the next unmanned target system.

The USAF Air Defense Weapons Center and Tyndall AFB were made a part of Tactical Air Command in October, 1979. During that reorganization, TAC assumed the air defense responsibilities and added a Deputy Chief of Staff for Air Defense to command the newly acquired forces. On July 1, 1981, the 325th Fighter Weapons Wing was established under the Center.

Tyndall AFB is home of Project William Tell, the USAF Worldwide Weapons Meet. First held at Tyndall AFB in 1958, this biannual event tests the proficiency of the North American air defense organization through competition between USAF, Air National Guard, and Canadian F-101, F-102, and F-106 fighter interceptor units.

PRIMARY MISSION

The primary mission of the USAF Air Defense Weapons Center is as follows:

1. Develop tactics and techniques using manned interceptors.

2. Train interceptor aircrews and interceptor ground environment instructors.

3. Improve weapons systems through test and evaluation.

4. Provide specialized aircrew life support training for TAC and Air National Guard requirements.

5. Support the TAC firing program.

6. Support operations of other commands as directed.

7. Develop instructional strategies, training systems, and software for formal training courses, as assigned; and provide a learning center and media studio.

8. Exercize command jurisdiction over all assigned units, facilities, and attached units, as directed.

TENANT MISSON

The major tenants at Tyndall AFB and their missions are summarized below:

678 Air Defense Group

The mission of the 678 Air Defense Group is to (1) operate and maintain the backup control center in the SAGE Command and Control System; (2) operate and maintain long-range radar equipment and provide search and height information to the region control center; (3) supervise all Air Force combat and support units assigned to the Air Division when it is inoperative; and (4) conduct air defense operations

within the limits of the unit, when required. The unit is scheduled to be replaced in early 1982 by the Region Operations Control Center (ROCC), which will be responsible for air surveillance for the southeastern section of the United States.

Detachment 5, 39 Aerospace Reserve and Recovery Wing: The mission of this detachment is to (1) clear the launch areas and retrieve aerial drones from land, water, and aerial ranges; (2) provide 30-minute search and rescue response for USAFADWC operations within the local flying areas; (3) provide administrative and airlift support; (4) support global combat rescue requirements; and (5) provide search and rescue forces and equipment.

306 Field Training Detachment: The mission of the 306 FTD is to (1) provide job-oriented system and associated training on specific weapons systems and associated aerospace ground equipment; and (2) provide advisory training for basewide on-the-job training service.

3625 Technical Training Squadron: The mission of the 3625 TTS is to (1) train officers and enlisted personnel to perform entry-level duties as weapons controllers; and (2) requalify officers as manual weapons controllers for assignment at worldwide overseas locations. The unit is home for the USAF Interceptor Weapons School under Air Training Command.

Detachment 4, 4603 Management Engineering Flight: The mission of this detachment is to equip, administer, train, and provide personnel to (1) furnish manpower and organization assistance and guidance to all units serviced; (2) develop and maintain manpower standards; and (3) perform management advisory studies.

Appendix E
MASTER LIST OF INDUSTRIAL SHOPS AND LABORATORIES

Appendix E
MASTER LIST OF INDUSTRIAL SHOPS AND LABORATORIES

Name	Present Location and Dates (Building Number)		Past Location and Dates (Building Number)		Handles Hazardous Materials	Handles Hazardous Waste	T/S/D[a]
Aircraft Washrack	83	1961-Present	158	1942-1961	x	x	Oil/water separator
Aerospace Ground Equipment	264	1959-Present			x	x	DPDO
AIM Missile Maintenance	246	1959-Present					
Corrosion Control	158	1955-Present			x	x	DPDO
Egress Systems	182	1959-Present					
Fuel System Repair	316	1972-Present			x	x	Fire Training
Trailer Maintenance	7020	1962-Present					
Wheel & Tire Shop	540	1942-Present			x	x	DPDO
Parachute Shop	227	1962-Present					
Paint Hangar	315	1972-Present			x	x	DPDO
Allied Trades	560	1965-Present			x	x	DPDO
Fire Truck Maintenance	575	1977-Present					
Refueling Vehicle Maintenance	561	1965-Present					
Vehicle Maintenance	560	1965-Present					
Bowling Lanes Maintenance	914	1967-Present					
Photo Lab.	741	1943-Present					
CE Carpentry Shop	421	1971-Present					
CE Entomology	6016	1943-Present					
CE Fire Ext. Maintenance	543	1959-Present					
CE Golf Course Maintenance	3017	1972-Present					
CE Heating Shop	421	1971-Present					
CE Plumbing Shop	421	1971-Present					
CE Sheet Metal Shop	421	1971-Present					
Sewage Treatment Plant	1723	1945-Present					
Jet Engine Test Cell	239	1969-Present					
Jet Engine Repair Shop	258	1956-Present					
Bearing Cleaning Shop	258	1956-Present			x	x	DPDO
Pneudraulics Shop	158	1979-Present	227	1962-1979	x	x	DPDO
NDI Lab.	310	1972-Present			x	x	CPDO
Machine Shop	158	1942-Present					
Lead Acid Battery Shop	158	1942-Present			x	x	Neutralization/ Sanitary Sewer

Appendix E--Continued

Name	Present Location and Dates (Building Number)		Past Location and Dates (Building Number)		Handles Hazardous Materials	Handles Hazardous Waste	T/S/D[a]
Nickel-Cadmium Battery Shop	158	1942-Present					
Jet Engine Cleaning	258	1970-Present			x	x	DPDO
Structural Repair	158	1942-Present					
Welding Shop	158	1942-Present					
MG-13 Shop	188	1942-Present					
Hangar Maintenance	156	1943-Present					
Hangar Maintenance	180	1959-Present					
Hangar Maintenance	182	1959-Present					
Hangar Maintenance	227	1962-Present					
Hangar Maintenance	280	1955-Present					
Hangar Maintenance	9310	1978-Present					
Aircraft Gen. Purpose Shop	180	1959-Present					
Aircraft Gen. Purpose Shop	182	1959-Present					
Aircraft Gen. Purpose Shop	209	1943-Present					
Aircraft Gen. Purpose Shop	227	1962-Present					
Aircraft Gen. Purpose Shop	446	1942-Present					
Aircraft Gen. Purpose Shop	535	1943-Present					
Aircraft Gen. Purpose Shop	540	1943-Present					
Avionics Shop	182	1959-Present					
Avionics Shop	186	1959-Present					
Avionics Shop	205	1955-Present					
Avionics Shop	446	1942-Present					
Communications/Electronics Shop	182	1959-Present					
Communications/Electronics Shop	150	1944-Present					
Communications/Electronics Shop	460	1963-Present					
Weapons Release Shop	188	1976-Present					
Surveillance Equipment Shop	227	1962-Present					
Pilotless Aircraft Shop	256	1960-Present					
Maintenance Dock	316	1972-Present					
AID Training Shop	156	1981-Present	444	1943-1981			
Base Maintenance Shop	421	1971-Present					
Base Maintenance Shop	424	1971-Present					
Base Maintenance Shop	582	1942-Present					

Appendix E--Continued

Name	Present Location and Dates (Building Number)	Past Location and Dates (Building Number)	Handles Hazardous Materials	Handles Hazardous Waste	T/S/D[a]
Base Maintenance Shop	1724 1950-Present				
Base Maintenance Shop	6028 1945-Present				
Base Maintenance Shop	6065 1969-Present				
Base Maintenance Shop	9706 1958-Present				
PME Lab	462 1975-Present				
PME Lab	463 1975-Present				
AF Clinic	1465 1967-Present	Hospital facilities			
Dental Clinic	1465 1967-Present	previously located in			
AF Env. Health Lab.	1465 1967-Present	Buildings 1325-1349			
Hospital Maintenance Shop	1465 1967-Present	from 1943 to 1967			
Marine Maintenance Shop	5025 1971-Present				
Marine Maintenance Shop	5026 1975-Present				
Conventional Maintenance Shop	7002 1970-Present				
Missile Run/Up Shop	7023 1970-Present				
Missile Assembly Shop	7026 1963-Present				
Missile Service Shop	8522 1961-Present				
AFESC Field Technology	9706 1978-Present				
AFESC Pavement Testing Lab.	530 1974-Present				

[a]Treatment, storage, or disposal methods.

Appendix F
INVENTORY OF EXISTING FUEL STORAGE TANKS

Appendix F
INVENTORY OF EXISTING FUEL STORAGE TANKS

Facility Number	Type Fuel	Capacity/Gals	Type Tank
21	Contaminated JP4	12,000	Aboveground
505	JP4	25,000	Underground
506	JP4	25,000	Underground
507	JP4	25,000	Underground
508	JP4	25,000	Underground
510	DF-2	25,000	Underground
511	DF-2	25,000	Underground
512	MOGAS	25,000	Underground
513	MOGAS	25,000	Underground
514	JP4	121,000	Aboveground/Diked
515	Empty	25,000	Underground
516	Empty	25,000	Underground
517	Empty	25,000	Underground
518	Empty	25,000	Underground
519	Empty	25,000	Underground
520	Empty	25,000	Underground
564	MOGAS	10,000	Underground
565	MOGAS	10,000	Underground
1274	DF-2	42,000	Aboveground/Diked
6036	AVGAS	20,000	Aboveground/Diked
6039	Diesel	15,000	Aboveground/Diked
6044	JP4	111,000	Aboveground/Diked
6045	JP4	417,000	Aboveground/Diked
6045	JP4	833,000	Aboveground/Diked
6047	JP4	833,000	Aboveground/Diked
183	MOGAS	2,000	Underground
264	MOGAS	1,000 (2)	Underground
9704	MOGAS	3,000	Aboveground
968	MOGAS	10,000 (3)	Underground
968	Waste Oil	3,000	Underground
Capehart Marina	MOGAS	3,000	Aboveground
Tyndall Park	MOGAS	1,000	Aboveground
227	DF-2	2,000	Underground
587	DF-2	10,000	Underground
1057	DF-2	12,000	Underground
1465	DF-2	12,000	Underground
1723	DF-2	1,000	Aboveground
7020	DF-2	1,000	Underground
9706	DF-2	1,000	Underground
Aeroclub	AVGAS	3,000	Underground

Appendix G
ABANDONED FUEL TANK LOCATION SUMMARY

Appendix G
ABANDONED FUEL TANK LOCATION SUMMARY

Location (Building Number)	Capacity/Gals	Underground	Aboveground
4572	500	x	
1424	1,000	x	
1582	1,000 (2)	x	
1420	1,000 (2)	x	
1506	1,000 (2)	x	
1437	1,000	x	
1441	1,000	x	
1445	1,000	x	
1449	1,000	x	
1434	1,000	x	
1438	1,000	x	
1442	1,000	x	
1453	1,000	x	
1457	1,000	x	
1463	1,000	x	
1455	1,000	x	
1476	1,000 (2)	x	
1307	1,000 (2)	x	
1470	1,000 (2)	x	
759	1,000	x	
911	1,000	x	
703	1,000	x	
753	1,000	x	
757	1,000	x	
751	1,000	x	
759	1,000	x	
916	1,000	x	
747	1,000	x	
745	1,000	x	
710	1,000	x	
713	1,000	x	
1003	1,000 (2)	x	
1057	1,500	x	
1041	1,000 (2)	x	
1610	1,000 (2)	x	
1602	1,000 (2)	x	
1532	1,000 (2)	x	
1057	1,500	x	
930	1,000 (2)	x	
920	1,000 (2)	x	
916	1,000	x	
911	1,000	x	
207	1,000	x	
634	1,000	x	
208	1,000	x	
832	1,000	x	
820	1,000	x	

Appendix G--Continued

Location (Building Number)	Capacity/Gals	Underground	Aboveground
842	1,000	x	
470	1,000	x	
471	1,000	x	
472	1,000	x	
653	1,000 (2)	x	
812	1,000 (2)	x	
808	1,000 (2)	x	
660	1,000	x	
664	1,000	x	
844	1,000 (2)	x	
1408	1,500	x	
854	1,000 (2)	x	
1404	1,000 (2)	x	
1311	1,000 (2)	x	
816	1,000 (2)	x	
650	1,000	x	
820	1,000	x	
1129	1,000 (2)	x	
1114	1,000 (2)	x	
1115	1,000 (2)	x	
1620	1,000 (2)	x	
1442	1,000	x	
1610	1,000 (2)	x	
1614	1,000 (2)	x	
1613	1,000	x	
1723	1,000	x	
258	2,000	x	
214	500	x	
260	500	x	
209	1,000	x	
205	1,000	x	
540	1,000	x	
266	500	x	
538	1,000	x	
535	500	x	
531	1,000	x	
153	1,000 (2)	x	
135	1,000	x	
158	1,000	x	
131	1,000	x	
160	1,000	x	
530	1,000	x	
546	2,500	x	
727	1,000	x	
1015	1,000	x	
1025	1,000	x	
1027	1,500	x	
1031	1,000	x	

Appendix G--Continued

Location (Building Number)	Capacity/Gals	Underground	Aboveground
501	1,000	x	
432	1,000	x	
444	1,000	x	
453	1,000	x	
456	1,000 (2)	x	
421	1,000	x	
(AVGAS) 6035	20,000		x
(Contaminated AVGAS) 6038	15,000		x

Appendix H
INVENTORY OF OIL/WATER SEPARATOR PRETREATMENT FACILITIES

Appendix H
INVENTORY OF OIL/WATER SEPARATION PRETREATMENT FACILITIES

Location (Bldg. No.)	Capacity (Gallons)	Date of Installation	Discharge
83	2,297	1961	Sanitary Sewer
	7,578 (Skimmer Separator)		
239	2,500	1969	Storm Sewer--will be connected to sanitary sewer in the near future
256	2,500	1960	Sanitary Sewer
264	200	1980	Sanitary Sewer
315	10,200	1972	Sanitary Sewer
316	700	1972	Sanitary Sewer
560	450	1965	Sanitary Sewer
561	350	1965	Sanitary Sewer
571	250	1974	Sanitary Sewer
934	500	1979	Sanitary Sewer

Appendix I
SITE HAZARD EVALUATION METHODOLOGY

HQ AIR FORCE ENGINEERING AND SERVICES CENTER
AND
USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY

SITE RATING METHODOLOGY

FOR

PHASE I
INSTALLATION RESTORATION PROGRAM

July 1981

SITE RATING METHODOLOGY
FOR
PHASE I INSTALLATION RESTORATION PROGRAM

1. This site rating methodology for Phase I of the Installation Restoration Program (IRP) has been jointly developed by CH2M HILL and Engineering-Science based on experience in performing Record Searches at several Air Force installations. This standard site rating system should be used for all Air Force IRP Records Search efforts to assist in Air Force prioritization and commitment of resources for Phase II survey actions.

2. The basis for the rating system is the document developed by JFB Associates, Inc., for the EPA Hazardous Waste Enforcement office. The JRB system was modified to accurately address specific Air Force installation conditions and to provide meaninful comparison of landfills and contaminated areas other than landfills.

3. Questions pertaining to use of the Air Force Site Rating Methodology should be addressed to either Mr. Lindenberg, AFESC/DEVP, AUTOVON 970-6189 (Commercial (904) 283-6189) or Major Fishburn, USAF OEHL/EC, AUTOVON 240-3305 (Commercial (512) 536-3305).

Note: Both CH2M HILL and Engineering-Science are Engineering Support contractors for the US Air Force.

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site _____

Location _____

Owner/Operator _____

Comments _____

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet		4		
Distance to Nearest Drinking Water Well		15		
Distance to Reservation Boundary		6		
Land Use/Zoning		3		
Critical Environments		12		
Water Quality of Nearby Surface Water Body		6		
Number of Assumed Values = _____ Out of 6		SUBTOTALS	_____	_____
Percentage of Assumed Values = _____ %		SUBSCORE		_____
Number of Missing Values = _____ Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = _____ %				

PATHWAYS				
Evidence of Water Contamination		10		
Level of Water Contamination		15		
Type of Contamination, Soil/Biota		5		
Distance to Nearest Surface Water		4		
Depth to Groundwater		7		
Net Precipitation		6		
Soil Permeability		6		
Bedrock Permeability		4		
Depth to Bedrock		4		
Surface Erosion		4		
Number of Assumed Values = _____ Out of 10		SUBTOTALS	_____	_____
Percentage of Assumed Values = _____ %		SUBSCORE		_____
Number of Missing Values = _____ Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = _____ %				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE _____

Reason for Assigned Hazardous Rating:

_____

_____

_____

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site		7		
Hazardous Waste Quantity		7		
Total Waste Quantity		4		
Waste Incompatibility		3		
Absence of Liners or Confining Beds		6		
Use of Leachate Collection System		6		
Use of Gas Collection Systems		2		
Site Closure		8		
Subsurface Flows		7		
		SUBTOTALS	_____	_____

Number of Assumed Values = ____ Out of 9

Percentage of Assumed Values = ____%

Number of Missing and Non-Applicable Values = ____ Out of 9

Percentage of Missing and Non-Applicalbe Values = ____%

SUBSCORE _____

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = ____ Out of 25

Overall Percentage of Assumed Values = ____%

OVERALL SCORE _____

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

RATING FACTOR SYSTEM GUIDELINES				
RECEPTORS				
	Rating Scale Levels			
Rating Factors	0	1	2	3
Population within 1,000 Feet	0	1 to 25	26 to 100	Greater than 100
Distance to Nearest Drinking Water Well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet
Distance to Reservation Boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet
Land Use/Zoning	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential
Critical Environments	Not a critical environment	Pristine natural areas	Wetlands; flood plains, and preserved areas; presence of economically important natural resources	Major habitat of an endangered or threatened species; presence of recharge area
Water Quality Designation of Nearest Surface-Water Body	Agricultural or industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies
	PATHWAYS			
Evidence of Water Contamination	No contamination	Indirect evidence	Positive proof from direct observation	Positive proof from laboratory analyses
Level of Water Contamination	No contamination	Low levels, trace levels, or levels less than maximum contaminant level (MCL) or EPA drinking water standards	Moderate levels or levels near MCL or EPA drinking water standards	High levels greater than MCL or EPA drinking water standards
Type of Contamination Soil/Biota	No contamination	Suspected contamination	Moderate contamination	Severe contamination
Distance to Nearest Surface Water	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet
Depth to Ground Water	Greater than 500 feet	51 to 500 feet	11 to 50 feet	0 to 10 feet
Net Precipitation	Less than −10 inches	−10 to +5 inches	+5 to +20 inches	Greater than +20 inches
Soil Permeability	Greater than 50% clay ($<10^{-6}$ cm/s)	30% to 50% clay (10^{-4} to 10^{-6} cm/s)	15% to 30% clay (10^{-2} to 10^{-4} cm/s)	0% to 15% clay ($>10^{-2}$ cm/s)
Bedrock Permeability	Impermeable ($<10^{-6}$ cm/s)	Relatively impermeable (10^{-4} to 10^{-6} cm/s)	Relatively impermeable (10^{-2} to 10^{-4} cm/s)	Very permeable ($>10^{-2}$ cm/s)
Depth to Bedrock	Greater than 60 feet	31 to 60 feet	11 to 30 feet	0 to 10 feet
Surface Erosion	None	Slight	Moderate	Severe

WASTE CHARACTERISTICS

Judgemental hazardous rating from 30 to 100 points based on the following guidelines:

Points	Condition
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

WASTE MANAGEMENT PRACTICES

	Rating Scale Levels			
Rating Factors	0	1	2	3
Record Accuracy and Ease of Access to Site	Accurate records, no unauthorized dumping	Accurate records, no barriers	Incomplete records, no barriers	No records, no barriers
Hazardous Waste Quantity	<1 ton	1 to 5 tons	5 to 20 tons	>20 tons
Total Waste Quantity	0 to 10 acre feet	11 to 100 acre feet	101 to 250 acre feet	Greater than 250 acre feet
Waste Incompatibility	No incompatible wastes are present	Present, but does not pose a hazard	Present and may pose a future hazard	Present and posing an immediate hazard
Absence of Liners or Confining Strata	Liner and confining strata	Liner or confining strata	Low quality liner or low permeability strata	No liner, no confining strata
Use of Leachate Collection Systems	Adequate collection and treatment	Inadequate collection or treatment	Inadequate collection and treatment	No collection or treatment
Use of Gas Collection Systems	Adequate collection and treatment	Collection and controlled flaring	Venting or inadequate treatment	No collection or treatment
Site Closure	Impermeable cover	Low permeability cover	Permeable cover	Abandoned site, no cover
Subsurface Flows	Bottom of landfill greater than 5 feet above high ground-water level	Bottom of landfill occasionally submerged	Bottom of fill frequently submerged	Bottom of fill located below mean ground-water level

JRB RATING SYSTEM
INTRODUCTION AND METHODOLOGY

Source: "Methodology for Rating the Hazard Potential of Waste Disposal Sites" JRB Associates, Inc., December 15, 1980

Note: The following material includes Chapters 1 and 2 of the JRB Report. The reader is referred to the above source for the complete report.

CHAPTER 1.0 INTRODUCTION

As part of EPA's nationwide waste management program, land disposal facilities containing hazardous wastes will be investigated and evaluated. Remedial action plans will be formulated for those sites presenting a significant hazard. Because resources for this task are limited, the initial focus of the work must be on the most hazardous sites. Under the auspices of EPA's Office of Enforcement, JRB Associates has devised a methodology for selecting sites for investigation based on their high potential for environmental impact.

This methodology has several advantages over other rating systems:

- It is easy to use
- It does not require users to have an extensive technical background
- It uses readily available information
- It does not require complex chemical or hydrological analyses
- It does not require users to visit the facilities in question
- It allows sites to be rated even if some data needs cannot be met.

The system consists of 31 rating factors that are divided into 4 categories: receptors; pathways; waste characteristics; and waste management practices. Factors in the receptors category determine the prime targets of environmental contamination. Factors in the pathways category assess mechanisms for contaminant migration. Factors in the waste characteristics category examine the types of hazards posed by contaminants in the site. Factors in the waste management practices category evaluate the quality of the facility's design and operation. Each rating factor has an associated four-level scale. Because all of these factors are not of equal importance, each also has been assigned a weighing factor, called a multiplier. Raters must simply decide

which level of the rating factor's scale is most appropriate for a given site and multiply the numeric value of that level by the corresponding multiplier. The sum of the products for the 31 factors divided by the maximum possible score and multiplied by 100 is the site's rating. The ratings are on a scale of 0 to 100 and can be interpreted in relative or absolute terms.

Users can assign additional points when the rating factors do not adequately address all of the problems of a site. However, only a limited number of additional points can be assigned. This arrangement helps to ensure that a site's rating is both complete and objective.

The methodology has been designed primarily for landfills, surface impoundments, and other types of land-based storage and disposal facilities. Incinerators and waste treatment facilities, however, are beyond scope with the exception of the solid wastes produced by them.

Site ratings should be performed as part of an overall investigation procedure. Prior to a site visit, ratings can be based on published materials, public and private records, and contacts with knowledgable parties. The results of this type of rating can be used to determine which sites present the greatest potential hazard and should be visited first. A final rating can be obtained with information obtained from a visit to a site. This rating can be used as a tool to help determine how limited resources should be spent for additional sampling, which may be required to fill data gaps, and for preparing remedial action plans and/or enforcement cases for sites that represent particularly severe hazards.

The methodology's validity has been tested at sites across the country. This testing includes comparing ratings completed for the same facilities both by different raters, and before and after site visits. Officials of New Jersey's Department of Environmental Protection agreed that the ratings on 30 sites in their state were good reflections of the true hazard potential of those sites. These results show that the methodology is an exceptionally useful and efficient tool for classifying and ranking the hazard potential of land disposal facilities.

The methodology is discussed in more detail in the following four chapters. Chapter 2 describes the six basic components of the methodology. Chapter 3 identifies sources of information for the system and describes how to resolve data gaps. Chapter 4 presents the step-by-step procedure for rating sites, and Chapter 5 discusses how site ratings can be used. The three appendices provide guidance for rating sites. Finally, the glossary located at the end of this document defines all terms related to the methodology.

CHAPTER 2.0 DESCRIPTION OF THE METHODOLOGY

The site rating methodology has been developed in terms of six elements. These are:

- Factor categories
- Rating factors
- Rating scales
- Multipliers
- Additional points
- Hazard potential scores.

These elements are described below.

2.1 FACTOR CATEGORIES

In assessing the environmental impacts of any hazardous waste disposal site, four considerations must be addressed. These are:

- Receptors
- Pathways
- Waste characteristics
- Waste management practices.

Receptors refer to the biota (human and non-human) which are potentially affected by the materials released from a waste disposal site. Within this category, special attention is given to human populations and critical environments. Pathways refer to aspects of the routes by which hazardous materials can escape from a given site. The focus of this cateory is on the ease of migration of water soluble pollutants and on contamination due to the site. Waste characteristics refer to the types of hazards posed by materials in the facility in terms of both their health-related effects and their environmental mobility. Waste management practices refer to the design characteristics and management practices of a given disposal site as they

relate to the site's environmental impact. In particular, this category examines measures that are being taken to minimize exposure to hazardous wastes.

The prime importance of the factor categories is in partitioning the rating factors into manageable groups so that site ratings can be more easily and completely interpreted. This topic is discussed in greater detail in Chapter 5.

2.2 RATING FACTORS

The initial rating of a waste disposal facility is based on a set of 31 rating factors. Each of these has been assigned to one of the four factor categories. The receptors catgegory has five rating factors:

- "Residential population within 1,000 feet" and "Distance to the nearest off-site building" measure the potential for human exposure to the site
- "Distance to the nearest drinking-water well" measures the potential for human ingestion of contaminants should underlying aquifers be polluted
- "Land use/zoning" evaluates the current and anticipated uses of the surrounding area
- "Critical environments" assesses the potential for adversely affecting important biological resources and fragile natural settings.

The pathways category contains nine rating factors concerned with the potential migration and attenuation of contaminants. The primary focus is on waterborne pollutants, since they can affect the greatest number of people.

- "Distance to the nearest surface water" and "Depth to groundwater" measure the availability of pollutant migration routes
- "Soil permeability," "bedrock permeability," and "depth to bedrock" measure the potential for contaminant attenuation and ease of migration

- "Net precipitation" uses annual precipitation and evapotranspiration to estimate the amount of leachate a site produces

- "Evidence of contamination," "type of contamination," and "level of contamination" evaluate pollution currently apparent at the site.

The waste characteristics category contains rating factors which examine the waste's environmental mobility and the adverse effects it can cause.

- "Solubility," "volatility," and "physical state" measure the extent to which mobile wastes can leave the site

- "Toxicity," "radioactivity," and "persistence" assess the site's potential to cause health-related injuries

- "Ignitability," "reactivity," and "corrosiveness" evaluate the possibility of fire, explosion, or similar emergencies.

The waste management practices factor category evaluates site design and operation. This category includes eight rating factors:

- "Use of leachate collection systems," "use of gas collection systems," and "use of liners" examine features of site design for containing contamination

- "Site security" assesses the measures taken to limit site access

- "Total waste quantity" and "hazardous waste quantity" measure the quantity of waste in the site, and thus, the potential magnitude of resulting contamination

- "Waste incompatibility" evaluates the potential for incompatible wastes to combine and pose a hazard

- "Use of containers" assesses the adequacy of using containers to isolate wastes.

These factors have been selected because they are relevant to an evaluation of any land-based disposal facility. The definition and purpose of each rating factor appear in Appendix A.

2.3 RATING SCALES

For each of the factors, a four-level rating scale has been developed which provides factor-specific levels ranging from "0" (indicating no potential hazard) to "3" (indicating a high potential hazard). The rating factors and their corresponding rating scales for each of the factor categories are listed in Table 1. These scales have been defined so that the rating factors typically can be evaluated on the basis of readily available information from published materials, public and private records, contacts with knowledgeable parties, or site visits. Raters compare the information collected for a site with the limits set in the scales, and see which level of each scale most closely fits the information. The numeric value of that level is the factor rating for that factor. This process is described in more detail in Chapter 4. Additional guidance for assessing the rating scales appears in Appendix A.

2.4 MULTIPLIERS

The rating factors do not all assess the same magnitude of potential environmental impact. Consequently, a numerical value called a multiplier has been assigned to each factor in accordance with the relative magnitude of impact that it does assess. These values are multiplied, hence the term multiplier, by the appropriate factor ratings (see Section 2.3) to result in factor scores for each of the rating factors. The 31 multipliers appear as the third column from the right on the methodology's two-page Rating Form (see Figure 3).

2.5 ADDITIONAL POINTS

Special features of a facility's location, design, or operation are frequently encountered that cannot be handled satisfactorily by rating factors alone. These features might present hazards that are unusually serious, unique to the site, or not assessable by rating scales. For example, an extremely high population density near a site should be considered even more hazardous than the rating factor for "population within 1,000 feet" indicates.

Power lines running through sites containing explosive or flammable wastes, though not generally typical of waste disposal sites, should be considered a potential hazard. Finally, the function of the nearest off-site building might indicate a serious threat of human exposure exists, even though types of functions cannot be quantitatively evaluated by rating scales the way distance can be. In such cases, raters should assign a greater hazard potential score to a site than it might otherwise receive by using the additional points system. To guide raters as to the types of situations that might warrant additional points, several examples have been identified for each of the factor categories. These are:

RECEPTORS

- Use of site by local residents
- Neighboring land use
- Neighboring transportation routes, drinking water supplies, and important natural resources.

PATHWAYS

- Extreme runoff and erosion problems
- Slope instability
- Flooding
- Seismic activity.

WASTE CHARACTERISTICS

- Carcinogenicity, mutagenicity, and teratogenicity
- Infectiousness
- Low biodegradability
- High-level radioactivity.

WASTE MANAGEMENT PRACTICES

- Excessively large waste quantities
- Open burning of wastes
- Site abandonment
- Unsafe disposal practices
- Inadequate cover
- Inadequate safety precautions
- Inadequate recordkeeping.

Table 1. Rating Factors and Scales for Each of the Four Factor Categories (Continued)

RATING FACTORS	RATING SCALE LEVELS			
	0	1	2	3
RECEPTORS				
POPULATION WITHIN 1,000 FEET	0	1 TO 25	26 TO 100	GREATER THAN 100
DISTANCE TO NEAREST DRINKING-WATER WELL	GREATER THAN 3 MILES	1 TO 3 MILES	3,001 FEET TO 1 MILE	0 TO 3,000 FEET
DISTANCE TO NEAREST OFF-SITE BUILDING	GREATER THAN 2 MILES	1 TO 2 MILES	1,001 FEET TO 1 MILE	0 TO 1,000 FEET
LAND USE-ZONING	COMPLETELY REMOTE (ZONING NOT APPLICABLE)	AGRICULTURAL	COMMERCIAL OR INDUSTRIAL	RESIDENTIAL
CRITICAL ENVIRONMENTS	NOT A CRITICAL ENVIRONMENT	PRISTINE NATURAL AREAS	WETLANDS, FLOODPLAINS, AND PRESERVED AREAS	MAJOR HABITAT OF AN ENDANGERED OR THREATENED SPECIES
PATHWAYS				
EVIDENCE OF CONTAMINATION	NO CONTAMINATION	INDIRECT EVIDENCE	POSITIVE PROOF FROM DIRECT OBSERVATION	POSITIVE PROOF FROM LABORATORY ANALYSES
LEVEL OF CONTAMINATION	NO CONTAMINATION	LOW LEVELS, TRACE LEVELS, OR UNKNOWN LEVELS	MODERATE LEVELS OR LEVELS THAT CANNOT BE SENSED DURING A SITE VISIT BUT WHICH CAN BE CONFIRMED BY A LABORATORY ANALYSIS	HIGH LEVELS OR LEVELS THAT CAN BE SENSED EASILY BY INVESTIGATORS DURING A SITE VISIT
TYPE OF CONTAMINATION	NO CONTAMINATION	SOIL CONTAMINATION ONLY	BIOTA CONTAMINATION	AIR, WATER, OR FOODSTUFF CONTAMINATION
DISTANCE TO NEAREST SURFACE WATER	GREATER THAN 5 MILES	1 TO 5 MILES	1,001 FEET TO 1 MILE	0 TO 1,000 FEET
DEPTH TO GROUNDWATER	GREATER THAN 100 FEET	51 TO 100 FEET	21 TO 50 FEET	0 TO 20 FEET
NET PRECIPITATION	LESS THAN -10 INCHES	-10 TO +5 INCHES	+5 TO +20 INCHES	GREATER THAN +20 INCHES
SOIL PERMEABILITY	GREATER THAN 50% CLAY	30% TO 50% CLAY	15% TO 30% CLAY	0 TO 15% CLAY
BEDROCK PERMEABILITY	IMPERMEABLE	RELATIVELY IMPERMEABLE	RELATIVELY PERMEABLE	VERY PERMEABLE
DEPTH TO BEDROCK	GREATER THAN 60 FEET	31 TO 60 FEET	11 TO 30 FEET	0 TO 10 FEET

Table 1

RATING FACTORS AND SCALES FOR EACH OF THE FOUR FACTOR CATEGORIES

RATING FACTORS	RATING SCALE LEVELS			
	0	1	2	3
WASTE CHARACTERISTICS				
TOXICITY	SAX'S LEVEL 0 OR NFPA'S LEVEL 0	SAX'S LEVEL 1 OR NFPA'S LEVEL 1	SAX'S LEVEL 2 OR NFPA'S LEVEL 2	SAX'S LEVEL 3 OR NFPA'S LEVELS 3 OR 4
RADIOACTIVITY	AT OR BELOW BACKGROUND LEVELS	1 TO 3 TIMES BACKGROUND LEVELS	3 TO 5 TIMES BACKGROUND LEVELS	OVER 5 TIMES BACKGROUND LEVELS
PERSISTENCE	EASILY BIODEGRADABLE COMPOUNDS	STRAIGHT CHAIN HYDROCARBONS	SUBSTITUTED AND OTHER RING COMPOUNDS	METALS, POLYCYCLIC COMPOUNDS AND HALOGENATED HYDROCARBONS
IGNITABILITY	FLASH POINT GREATER THAN 200° OR NFPA'S LEVEL 0	FLASH POINT OF 140°F. to 200°F. OR NFPA'S LEVEL 1	FLASH POINT OF 80°F. TO 140°F. OR NFPA'S LEVEL 2	FLASH POINT LESS THAN 80°F. OR NFPA'S LEVELS 3 OR 4
REACTIVITY	NFPA'S LEVEL 0	NFPA'S LEVEL 1	NFPA'S LEVEL 2	NFPA'S LEVELS 3 OR 4
CORROSIVENESS	pH OF 6 TO 9	pH OF 5 TO 6 OR 9 TO 10	pH OF 3 TO 5 OR 10 TO 12	pH OF 1 TO 3 OR 12 TO 14
SOLUBILITY	INSOLUBLE	SLIGHTLY SOLUBLE	SOLUBLE	VERY SOLUBLE
VOLATILITY	VAPOR PRESSURE LESS THAN 0.1 mm Hg	VAPOR PRESSURE OF 0.1 TO 25 mm Hg	VAPOR PRESSURE OF 78 TO 25 mm Hg	VAPOR PRESSURE GREATER THAN 78 mm Hg
PHYSICAL STATE	SOLID	SLUDGE	LIQUID	GAS
WASTE MANAGEMENT PRACTICES				
SITE SECURITY	SECURE FENCE WITH LOCK	SECURITY GUARD BUT NO FENCE	REMOTE LOCATION OR BREACHABLE FENCE	NO BARRIERS
HAZARDOUS WASTE QUANTITY	0 TO 250 TONS	251 TO 1,000 TONS	1,001 TO 2000 TONS	GREATER THAN 2,000 TONS
TOTAL WASTE QUANTITY	0 TO 10 ACRE FEET	11 TO 100 ACRE FEET	101 TO 250 ACRE FEET	GREATER THAN 250 ACRE FEET
WASTE INCOMPATIBILITY	NO INCOMPATIBLE WASTES ARE PRESENT	PRESENT, BUT DOES NOT POSE A HAZARD	PRESENT AND MAY POSE A FUTURE HAZARD	PRESENT AND POSING AN IMMEDIATE HAZARD
USE OF LINERS	CLAY OR OTHER LINER RESISTENT TO ORGANIC COMPOUNDS	SYNTHETIC OR CONCRETE LINER	ASPHALT BASE LINER	NO LINER USED
USE OF LEACHATE COLLECTION SYSTEMS	ADEQUATE COLLECTION AND TREATMENT	INADEQUATE COLLECTION OR TREATMENT	INADEQUATE COLLECTION AND TREATMENT	NO COLLECTION OR TREATMENT
USE OF GAS COLLECTION SYSTEMS	ADEQUATE COLLECTION AND TREATMENT	COLLECTION AND CONTROLLED FLARING	VENTING OR INADEQUATE TREATMENT	NO COLLECTION OR TREATMENT
USE AND CONDITION OF CONTAINERS	CONTAINERS ARE USED AND APPEAR TO BE IN GOOD CONDITION	CONTAINERS ARE USED BUT A FEW ARE LEAKING	CONTAINERS ARE USED BUT MANY ARE LEAKING	NO CONTAINERS ARE USED

While this list is by no means exhaustive, and other examples may be encountered by raters using the methodology, it does include the more commonly occurring situations. Appendix B provides guidance on the number of additional points that should be assigned for these situations.

In order to maintain the objectivity of the rating methodology while allowing the assignment of additional points, the following limits are placed on the number of additional points that may be assigned in each factor category:

- Receptors 50 points
- Pathways 25 points
- Waste characteristics 20 points
- Waste management practices 30 points.

The number of additional points allowed in each factor category is a function of the total available rating factor points and the relative importance of the category.

The actual procedure for assigning additional points is outlined in Chapter 4.

2.6 HAZARD POTENTIAL SCORES

The result of a site rating is a set of five hazard potential scores. These scores are:

- Overall score
- Receptors subscore
- Pathways subscore
- Waste characteristics subscore
- Waste management practices subscore.

The overall score is based on all the rating factors and additional points that are used to rate a site. Each subscore is based on those rating factors

and additional points in that factor category which are used to rate a site. All of these scores are normalized so that they are on a scale of 0 to 100. The normalization procedure is described in Chapter 4. Associated with every hazard potential score is a percentage of missing and assumed data. These percentages flag scores that are based on large amounts of missing data and, generally, measure the reliability of the scores. Chapter 5 describes how to interpret these scores.

Appendix J
SITE RATING FORMS

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Q Wherry Landfill
Location: Tyndall AFB
Owner/Operator: Tyndall AFB
Comments: Operation 1943-1948

Rated By M. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	3	4	12	12
Distance to Nearest Drinking Water Well	2	15	30	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning N/A	0	3	0	0
Critical Environments	2	12	24	36
Water Quality of Nearby Surface Water Body	2	6	12	18
		SUBTOTALS	96	129
		SUBSCORE		74

Number of Assumed Values = 6 Out of 6
Percentage of Assumed Values = 0 %
Number of Missing Values = 1 Out of 6
Percentage of Missing Values = 17 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	3	4	12	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	1	4	4	12
		SUBTOTALS	73	195
		SUBSCORE		37

Number of Assumed Values = 0 Out of 10
Percentage of Assumed Values = 0 %
Number of Missing Values = 0 Out of 10
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:

general refuse + mess hall wastes. No hazardous wastes known to have been disposed of here

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	1	4	4	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System	3	6	18	18
Use of Gas Collection Systems	3	2	6	6
Site Closure	2	8	16	24
Subsurface Flows	1	7	7	21
		SUBTOTALS	83	150
		SUBSCORE		55

Number of Assumed Values = 0 Out of 9
Percentage of Assumed Values = 0%
Number of Missing and Non-Applicable Values = 0 Out of 9
Percentage of Missing and Non-Applicalbe Values = 0%

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25
Overall Percentage of Assumed Values = 0%

OVERALL SCORE 48

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (2) Sabre Drive Landfill
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments Operation Intermittent 1943-65

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning N/A	0	3	0	0
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	1	6	6	18
		SUBTOTALS	39	129
		SUBSCORE		30

Number of Assumed Values = 0 Out of 6
Percentage of Assumed Values = 0 %
Number of Missing Values = 1 Out of 6
Percentage of Missing Values = 17 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	3	4	12	12
Depth to Groundwater	2	7	14	21
Net Precipitation	1		6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
		SUBTOTALS	62	195
		SUBSCORE		32

Number of Assumed Values = 0 Out of 10
Percentage of Assumed Values = 0 %
Number of Missing Values = 0 Out of 10
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:

general refuse. No hazardous wastes known to have been disposed of here

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	1	4	4	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System	3	6	18	18
Use of Gas Collection Systems	3	2	6	6
Site Closure	2	8	16	24
Subsurface Flows	1	7	7	21
		SUBTOTALS	83	150
		SUBSCORE		55

Number of Assumed Values = 0 Out of 9

Percentage of Assumed Values = 0 %

Number of Missing and Non-Applicable Values = 0 Out of 9

Percentage of Missing and Non-Applicaibe Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25

Overall Percentage of Assumed Values = 0 %

OVERALL SCORE 37

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (3) Beacon Beach Road Landfill
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments Operation 1952 - 1965

RATED BY M. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	1	6	6	18
Number of Assumed Values = 0 Out of 6		SUBTOTALS	33	129
Percentage of Assumed Values = 0 %		SUBSCORE		26
Number of Missing Values = 1 Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 17 %				

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	2	7	14	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	4	12
Number of Assumed Values = 0 Out of 10		SUBTOTALS	58	195
Percentage of Assumed Values = 0 %		SUBSCORE		30
Number of Missing Values = 0 Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 0 %				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:
general refuse. No hazardous wastes known to have disposed of here.

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	1	4	4	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System	3	6	18	18
Use of Gas Collection Systems	3	2	6	6
Site Closure	2	8	16	24
Subsurface Flows	1	7	7	21
		SUBTOTALS	83	150
		SUBSCORE		55

Number of Assumed Values = 0 Out of 9
Percentage of Assumed Values = 0 %
Number of Missing and Non-Applicable Values = 0 Out of 9
Percentage of Missing and Non-Applicalbe Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25
Overall Percentage of Assumed Values = 0 %

OVERALL SCORE 35

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (4) SE Runway Extension Burial Site
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments Intermittent 1945-65

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning N/A	0	3	0	0
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	2	6	12	18
Number of Assumed Values = 0 Out of 6		SUBTOTALS	63	129
Percentage of Assumed Values = 0 %		SUBSCORE		49
Number of Missing Values = 1 Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 17 %				

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	0	4	0	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
Number of Assumed Values = 0 Out of 10		SUBTOTALS	57	195
Percentage of Assumed Values = 0 %		SUBSCORE		29
Number of Missing Values = 0 Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 0 %				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:
verbal reports: disposal of old batteries, drums, and old parts from Base industrial facilities. Not known if drums empty or contain chemicals

WASTE MANAGEMENT PRACTICES

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site		2	7	14	21
Hazardous Waste Quantity		0	7	0	21
Total Waste Quantity		0	4	0	12
Waste Incompatibility	Assume	0	3	0	9
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System	N/A	—	6	—	—
Use of Gas Collection Systems	N/A	—	2	—	—
Site Closure	Assume	1	8	8	24
Subsurface Flows		1	7	7	21

Number of Assumed Values = 2 Out of 9
Percentage of Assumed Values = 22%
Number of Missing and Non-Applicable Values = 2 Out of 9
Percentage of Missing and Non-Applicalbe Values = 22%

SUBTOTALS 47 126
SUBSCORE 37
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 2 Out of 25
Overall Percentage of Assumed Values = 8%

OVERALL SCORE 41
(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (5) "6000" Area Landfill
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments Assumed intermittent 1945-1965

RATED BY N. HATCH + B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	2	6	12	18
Number of Assumed Values = 0 Out of 6		SUBTOTALS	69	129
Percentage of Assumed Values = 0 %		SUBSCORE		53
Number of Missing Values = 1 Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 17 %				

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	2	4	8	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
Number of Assumed Values = 0 Out of 10		SUBTOTALS	69	195
Percentage of Assumed Values = 0 %		SUBSCORE		33
Number of Missing Values = 0 Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 0 %				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:

verbal reports: disposal of old batteries, old parts, empty glass containers.

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility Assumed	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System	3	6	18	18
Use of Gas Collection Systems	3	2	6	6
Site Closure	2	8	16	24
Subsurface Flows	1	7	7	21
		SUBTOTALS	79	150
		SUBSCORE		53

Number of Assumed Values = 1 Out of 9

Percentage of Assumed Values = 11 %

Number of Missing and Non-Applicable Values = 0 Out of 9

Percentage of Missing and Non-Applicalbe Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 1 Out of 25

Overall Percentage of Assumed Values = 4 %

OVERALL SCORE 46

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (6) Sewage Plant Vicinity Landfill
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments Operation 1965-73

RATED BY N. HATCH + B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning N/A	0	3	0	0
Critical Environments	2	12	24	36
Water Quality of Nearby Surface Water Body	1	6	6	18
Number of Assumed Values = 0 Out of 6		SUBTOTALS	63	129
Percentage of Assumed Values = 0%		SUBSCORE		49
Number of Missing Values = 1 Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 17%				

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	3	4	12	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
Number of Assumed Values = 0 Out of 10		SUBTOTALS	69	195
Percentage of Assumed Values = 0%		SUBSCORE		35
Number of Missing Values = 0 Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 0%				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 60

Reason for Assigned Hazardous Rating:
Reports from many interviewees that drums + containers of waste oil and solvents (unauthorized) were disposed of

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	1	4	4	12
Waste Incompatibility Assumed	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System	3	6	18	18
Use of Gas Collection Systems	3	2	6	6
Site Closure	2	8	16	24
Subsurface Flows Assumed	2	7	14	21
		SUBTOTALS	90	150
		SUBSCORE		60

Number of Assumed Values = 2 Out of 9
Percentage of Assumed Values = 22%
Number of Missing and Non-Applicable Values = 0 Out of 9
Percentage of Missing and Non-Applicalbe Values = 0%

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 2 Out of 25
Overall Percentage of Assumed Values = 8%

OVERALL SCORE 50

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (7) Spray Field Vicinity Landfill
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments Operation 1973-77

RATED BY N. HATCH + B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning N/A	0	3	0	0
Critical Environments	2	12	24	36
Water Quality of Nearby Surface Water Body	1	6	6	18
Number of Assumed Values = 0 Out of 6		SUBTOTALS	63	129
Percentage of Assumed Values = 0%		SUBSCORE		49
Number of Missing Values = 1 Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 17%				

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	3	4	12	12
Depth to Groundwater	3	7	21	21
Net Precipitation Spray Field	2	6	12	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
Number of Assumed Values = 0 Out of 10		SUBTOTALS	75	
Percentage of Assumed Values = 0%		SUBSCORE		36
Number of Missing Values = 0 Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 0%				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 60

Reason for Assigned Hazardous Rating:
Reports from many interviewees that drums + containers of waste oil and solvents (unauthorized) were disposed of

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	2	4	8	12
Waste Incompatibility Assumed	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System	3	6	18	18
Use of Gas Collection Systems	3	2	6	6
Site Closure	2	8	16	24
Subsurface Flows	3	7	21	21
		SUBTOTALS	101	150
		SUBSCORE		67

Number of Assumed Values = 1 Out of 9
Percentage of Assumed Values = 11%
Number of Missing and Non-Applicable Values = 0 Out of 9
Percentage of Missing and Non-Applicalbe Values = 0%

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 1 Out of 25
Overall Percentage of Assumed Values = 4%

OVERALL SCORE 53

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (8) Golf Course Trash Disposal Site
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments Intermittent since '62 to present

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	1	6	6	18
Number of Assumed Values = 0 Out of 6		SUBTOTALS	63	129
Percentage of Assumed Values = 0 %		SUBSCORE		49
Number of Missing Values = 1 Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 17 %				

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	2	4	8	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
Number of Assumed Values = 0 Out of 10		SUBTOTALS	65	195
Percentage of Assumed Values = 0 %		SUBSCORE		33
Number of Missing Values = 0 Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 0 %				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:
Disposal of yard trash + trimmings from Golf Course

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System N/A	—	6	—	—
Use of Gas Collection Systems N/A	—	2	—	—
Site Closure N/A	—	8	—	—
Subsurface Flows	0	7	0	21
		SUBTOTALS	32	102
		SUBSCORE		31

Number of Assumed Values = 0 Out of 9
Percentage of Assumed Values = 0%
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33%

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25
Overall Percentage of Assumed Values = 0%

OVERALL SCORE 36

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (9) Capehart Burial Site
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments 1962

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	3	4	12	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	1	6	6	18
		SUBTOTALS	45	129
		SUBSCORE		35

Number of Assumed Values = 0 Out of 6
Percentage of Assumed Values = 0 %
Number of Missing Values = 1 Out of 6
Percentage of Missing Values = 17 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	2	4	8	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
		SUBTOTALS	65	195
		SUBSCORE		33

Number of Assumed Values = 0 Out of 10
Percentage of Assumed Values = 0 %
Number of Missing Values = 0 Out of 10
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:
Housing debris from '62 Tornado burned and buried AT site

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System N/A	—	6	—	—
Use of Gas Collection Systems N/A	—	2	—	—
Site Closure N/A	—	8	—	—
Subsurface Flows ASSUME	1	7	7	21
		SUBTOTALS	39	102
		SUBSCORE		38

Number of Assumed Values = 1 Out of 9
Percentage of Assumed Values = 11%
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33%

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 1 Out of 25
Overall Percentage of Assumed Values = 4%

OVERALL SCORE 34

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (10) Capehart Marina Rubble Storage
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments '75 To Present

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	1	4	4	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning N/A	—	3	—	—
Critical Environments	2	12	24	36
Water Quality of Nearby Surface Water Body	1	6	6	18
		SUBTOTALS	67	129
		SUBSCORE		52

Number of Assumed Values = 0 Out of 6
Percentage of Assumed Values = 0%
Number of Missing Values = 1 Out of 6
Percentage of Missing Values = 17%
(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	3	4	12	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
		SUBTOTALS	69	195
		SUBSCORE		35

Number of Assumed Values = 0 Out of 10
Percentage of Assumed Values = 0%
Number of Missing Values = 0 Out of 10
Percentage of Missing Values = 0%
(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:
Storage of concrete rubble + other inert materials on ground surface

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System N/A	—	6	—	—
Use of Gas Collection Systems N/A	—	2	—	—
Site Closure N/A	—	8	—	—
Subsurface Flows	0	7	0	21
		SUBTOTALS	32	102
		SUBSCORE		31

Number of Assumed Values = 0 Out of 9
Percentage of Assumed Values = 0 %
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25
Overall Percentage of Assumed Values = 0 %

OVERALL SCORE 37

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (11) Boy Scout Road Yard Trash Disposal
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments 1950 to present

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	2	6	12	18
Number of Assumed Values = 0 Out of 6		SUBTOTALS	75	129
Percentage of Assumed Values = 0 %		SUBSCORE		58
Number of Missing Values = 1 Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 17 %				

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination. Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	2	4	8	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
Number of Assumed Values = 0 Out of 10		SUBTOTALS	65	195
Percentage of Assumed Values = 0 %		SUBSCORE		33
Number of Missing Values = 0 Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 0 %				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:
Current disposal of tree limbs + yard trash

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System N/A	—	6	—	—
Use of Gas Collection Systems N/A	—	2	—	—
Site Closure N/A	—	8	—	—
Subsurface Flows	0	7	0	21
		SUBTOTALS	32	102
		SUBSCORE		31

Number of Assumed Values = 0 Out of 9
Percentage of Assumed Values = 0 %
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25
Overall Percentage of Assumed Values = 0 %

OVERALL SCORE 38

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (12) Highway 98 Burial Site
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments probable mid-60's

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	2	15	30	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	1	6	6	18
		SUBTOTALS	48	129
		SUBSCORE		37

Number of Assumed Values = 0 Out of 6
Percentage of Assumed Values = 0 %
Number of Missing Values = 1 Out of 6
Percentage of Missing Values = 17 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	2	7	14	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
		SUBTOTALS	54	195
		SUBSCORE		28

Number of Assumed Values = 0 Out of 10
Percentage of Assumed Values = 0 %
Number of Missing Values = 0 Out of 10
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:

Housing debris from razing of Tyndall and Magnolia Homes

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity Assume	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System N/A	—	6	—	—
Use of Gas Collection Systems N/A	—	2	—	—
Site Closure	2	8	16	24
Subsurface Flows Assume	0	7	0	21
		SUBTOTALS	48	126
		SUBSCORE		38

Number of Assumed Values = 2 Out of 9
Percentage of Assumed Values = 22%
Number of Missing and Non-Applicable Values = 2 Out of 9
Percentage of Missing and Non-Applicalbe Values = 22%

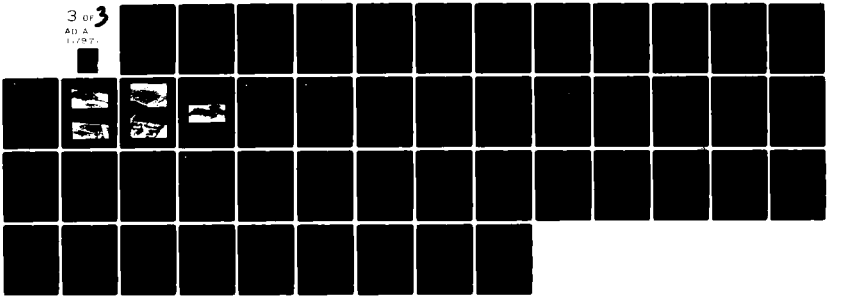
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 2 Out of 25
Overall Percentage of Assumed Values = 8%

OVERALL SCORE 33

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

AD-A117 971 CH2M HILL GAINESVILLE FL F/G 13/2
INSTALLATION RESTORATION PROGRAM RECORDS SEARCH FOR TYNDALL AIR--ETC(U)
JUN 82 F08637-80-G-0010
UNCLASSIFIED NL



WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (13) EOD Burial Site
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments operation 1950 - present

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	1	6	6	18
Number of Assumed Values = 0 Out of 6		SUBTOTALS	39	129
Percentage of Assumed Values = 0 %		SUBSCORE		30
Number of Missing Values = 1 Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 17 %				

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	2	4	8	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
Number of Assumed Values = 0 Out of 10		SUBTOTALS	65	195
Percentage of Assumed Values = 0 %		SUBSCORE		33
Number of Missing Values = 0 Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 0 %				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 40

Reason for Assigned Hazardous Rating:
Disposal of residue from incinerated or detonated unused ordnance

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System N/A	—	6	—	—
Use of Gas Collection Systems N/A	—	2	—	—
Site Closure N/A	—	8	—	—
Subsurface Flows Assume	1	7	7	21
		SUBTOTALS	39	102
		SUBSCORE		38

Number of Assumed Values = 1 Out of 9
Percentage of Assumed Values = 11 %
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 1 Out of 25
Overall Percentage of Assumed Values = 4 %

OVERALL SCORE 35

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (14) P.O.L. Area "A" Fuels storage
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments operation 1940- Present

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	2	6	12	18
		SUBTOTALS	75	129
		SUBSCORE		58

Number of Assumed Values = 0 Out of 6
Percentage of Assumed Values = 0%
Number of Missing Values = 1 Out of 6
Percentage of Missing Values = 17%

(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	1	5	5	15
Distance to Nearest Surface Water	3	4	12	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
		SUBTOTALS	74	195
		SUBSCORE		38

Number of Assumed Values = 2 Out of 10
Percentage of Assumed Values = 0%
Number of Missing Values = 0 Out of 10
Percentage of Missing Values = 0%

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 60

Reason for Assigned Hazardous Rating:
Known burial of residue from tank desludging that may have contained lead.

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System n/A	—	6	—	—
Use of Gas Collection Systems n/A	—	2	—	—
Site Closure	2	8	16	24
Subsurface Flows	1	7	7	21
		SUBTOTALS	55	126
		SUBSCORE		44

Number of Assumed Values = 0 Out of 9
Percentage of Assumed Values = 0 %
Number of Missing and Non-Applicable Values = 2 Out of 9
Percentage of Missing and Non-Applicalbe Values = 22 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25
Overall Percentage of Assumed Values = 0 %

OVERALL SCORE 50

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (15) POL Area "B" Fuels Storage
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments operation 1940 to present

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	1	6	6	18
Number of Assumed Values = 0 Out of 6		SUBTOTALS	57	129
Percentage of Assumed Values = 0 %		SUBSCORE		44
Number of Missing Values = 1 Out of 6		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 17 %				

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	1	5	5	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	2	7	14	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
Number of Assumed Values = 0 Out of 10		SUBTOTALS	59	195
Percentage of Assumed Values = 0 %		SUBSCORE		30
Number of Missing Values = 0 Out of 10		(Factor Score Divided by Maximum Score and Multiplied by 100)		
Percentage of Missing Values = 0 %				

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:

Known burial of residue from tank desludging that may have contained lead.

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System N/A	—	6	—	—
Use of Gas Collection Systems N/A	—	2	—	—
Site Closure	2	8	16	24
Subsurface Flows	0	7	0	21
		SUBTOTALS	48	126
		SUBSCORE		38

Number of Assumed Values = 0 Out of 9

Percentage of Assumed Values = 0 %

Number of Missing and Non-Applicable Values = 2 Out of 9

Percentage of Missing and Non-Applicalbe Values = 22 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25

Overall Percentage of Assumed Values = 0 %

OVERALL SCORE 40

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (16) "Shell Bank" Fire Training Area
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments 1943 - 1952; 1968 - 1980

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	2	6	12	18
		SUBTOTALS	75	129
		SUBSCORE		58

Number of Assumed Values = 0 Out of 6
Percentage of Assumed Values = 0 %
Number of Missing Values = 1 Out of 6
Percentage of Missing Values = 17 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	3	4	12	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
		SUBTOTALS	69	195
		SUBSCORE		35

Number of Assumed Values = 0 Out of 10
Percentage of Assumed Values = 0 %
Number of Missing Values = 0 Out of 10
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:
Waste oil and solvents stored in tanks until used for fire training. No evidence that hazardous wastes infiltrated ground.

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System n/A	—	6	—	—
Use of Gas Collection Systems n/A	—	2	—	—
Site Closure n/A	—	8	—	—
Subsurface Flows assume	1	7	7	21
		SUBTOTALS	39	102
		SUBSCORE		38

Number of Assumed Values = 1 Out of 9
Percentage of Assumed Values = 11 %
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33 %
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 1 Out of 25
Overall Percentage of Assumed Values = 4 %

OVERALL SCORE 40

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site (17) Hwy 98 Fire Training Area
Location Tyndall AFB
Owner/Operator Tyndall AFB
Comments 1952 - 1958

RATED BY N. HATCH & D. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	2	15	30	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	—	3	—	—
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	1	6	6	18
		SUBTOTALS	48	129
		SUBSCORE		37

Number of Assumed Values = 0 Out of 6
Percentage of Assumed Values = 0 %
Number of Missing Values = 1 Out of 6
Percentage of Missing Values = 17 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	2	7	14	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
		SUBTOTALS	54	195
		SUBSCORE		28

Number of Assumed Values = 0 Out of 10
Percentage of Assumed Values = 0 %
Number of Missing Values = 0 Out of 10
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:

waste oil and solvents stored in tanks until used. Buried empty drums reported; no hazardous wastes suspected.

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	0	7	0	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System N/A	—	6	—	—
Use of Gas Collection Systems N/A	—	2	—	—
Site Closure N/A	—	8	—	—
Subsurface Flows	0	7	0	21
		SUBTOTALS	32	102
		SUBSCORE		31

Number of Assumed Values = 0 Out of 9
Percentage of Assumed Values = 0 %
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25
Overall Percentage of Assumed Values = 0 %

OVERALL SCORE 31

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Lynn Haven Defense Fuel Support Point
Location: Lynn Haven DFSP
Owner/Operator: DLA
Comments: Fuel supply depot since 1940

RATED BY N. HATCH & B. HAAS

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning	2	3	6	9
Critical Environments	2	12	24	36
Water Quality of Nearby Surface Water Body	2	6	12	18
		SUBTOTALS	75	138
		SUBSCORE		54

Number of Assumed Values = 0 Out of 6
Percentage of Assumed Values = 0 %
Number of Missing Values = 0 Out of 6
Percentage of Missing Values = 0 %
(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	1	5	5	15
Distance to Nearest Surface Water	3	4	12	12
Depth to Groundwater	3	7	21	21
Net Precipitation	1	6	6	18
Soil Permeability	3	6	18	18
Bedrock Permeability	3	4	12	12
Depth to Bedrock	0	4	0	12
Surface Erosion	0	4	0	12
		SUBTOTALS	74	195
		SUBSCORE		38

Number of Assumed Values = 0 Out of 10
Percentage of Assumed Values = 0 %
Number of Missing Values = 0 Out of 10
Percentage of Missing Values = 0 %
(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 70

Reason for Assigned Hazardous Rating:

Known buried of AVGAS sludge. Bunker "C" detected at new oil/water separator, reported disposal near west gate.

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity Assume	1	7	7	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System N/A	—	6	—	—
Use of Gas Collection Systems N/A	—	2	—	—
Site Closure	2	8	16	24
Subsurface Flows	1	7	7	21
		SUBTOTALS	62	126
		SUBSCORE		49

Number of Assumed Values = 1 Out of 9
Percentage of Assumed Values = 11%
Number of Missing and Non-Applicable Values = 2 Out of 9
Percentage of Missing and Non-Applicalbe Values = 22%

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 1 Out of 25
Overall Percentage of Assumed Values = 4%

OVERALL SCORE 52

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

Appendix K
PHOTOGRAPHS

GN14649 EO

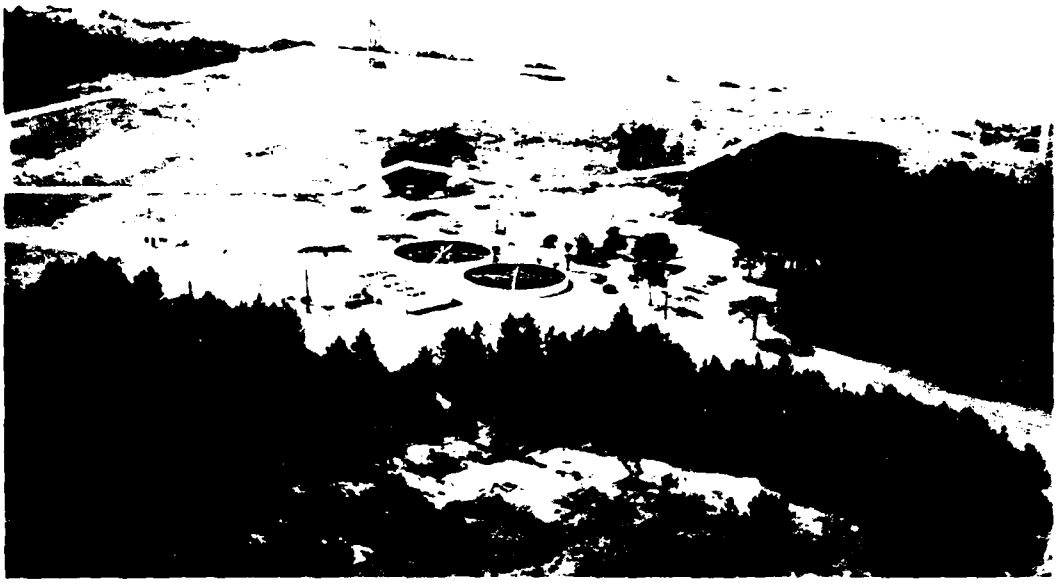


FIGURE K-1. *Location of Tyndall AFB past landfill Site No. 6 (Sewage Plant Vicinity Landfill).*

FIGURE K-2. Location of Tyndall AFB past landfill Site No. 7 (Spray Field Vicinity Landfill).

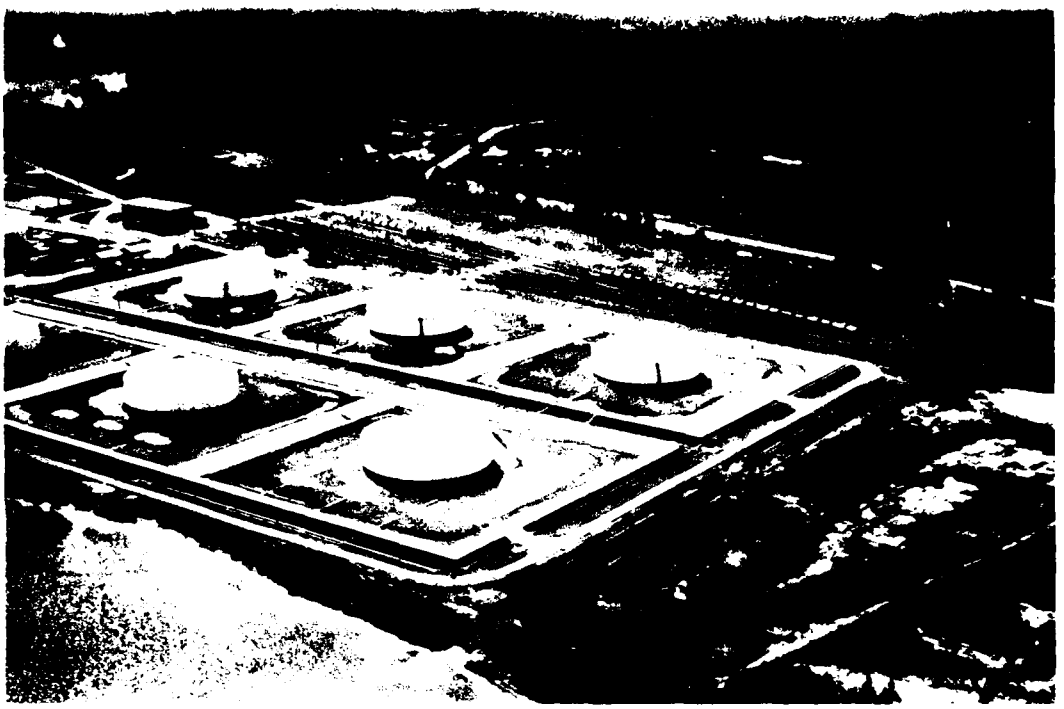


FIGURE K-3. Lynn Haven Defense Fuels Supply Point.

FIGURE K-4. Lynn Haven Defense Fuels Supply Point—approximate location of past Bunker C fuel disposal site.

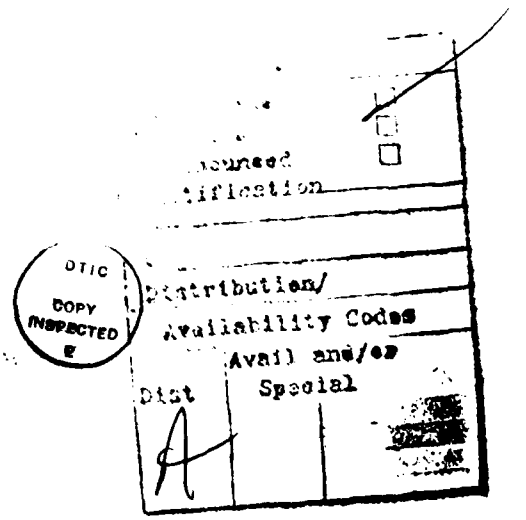
FIGURE K-5. Tyndall AFB Site No. 14 (POL Area "A")—location of fuel storage tank sludge disposal area.

INSTALLATION RESTORATION
PROGRAM RECORDS SEARCH

HAZARD ASSESSMENT RATING METHODOLOGY FOR TYNDALL AIR FORCE BASE, FLORIDA

Prepared for

Air Force Engineering and Services Center
Directorate of Environmental Planning
Tyndall Air Force Base, Florida 32403



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June 1982
Contract No. FO863780 G0010 0015

Appendix L
NEW HAZARDOUS ASSESSMENT RATING METHODOLOGY

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH_2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering Science, and CH_2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Record Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1). The site rating form is provided in Figure 2 and the rating factor guidelines are provided in Table 1.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste managment practices category factor to the sum of the scores for the other three categories.

SITE RATING METHODOLOGY FLOW CHART

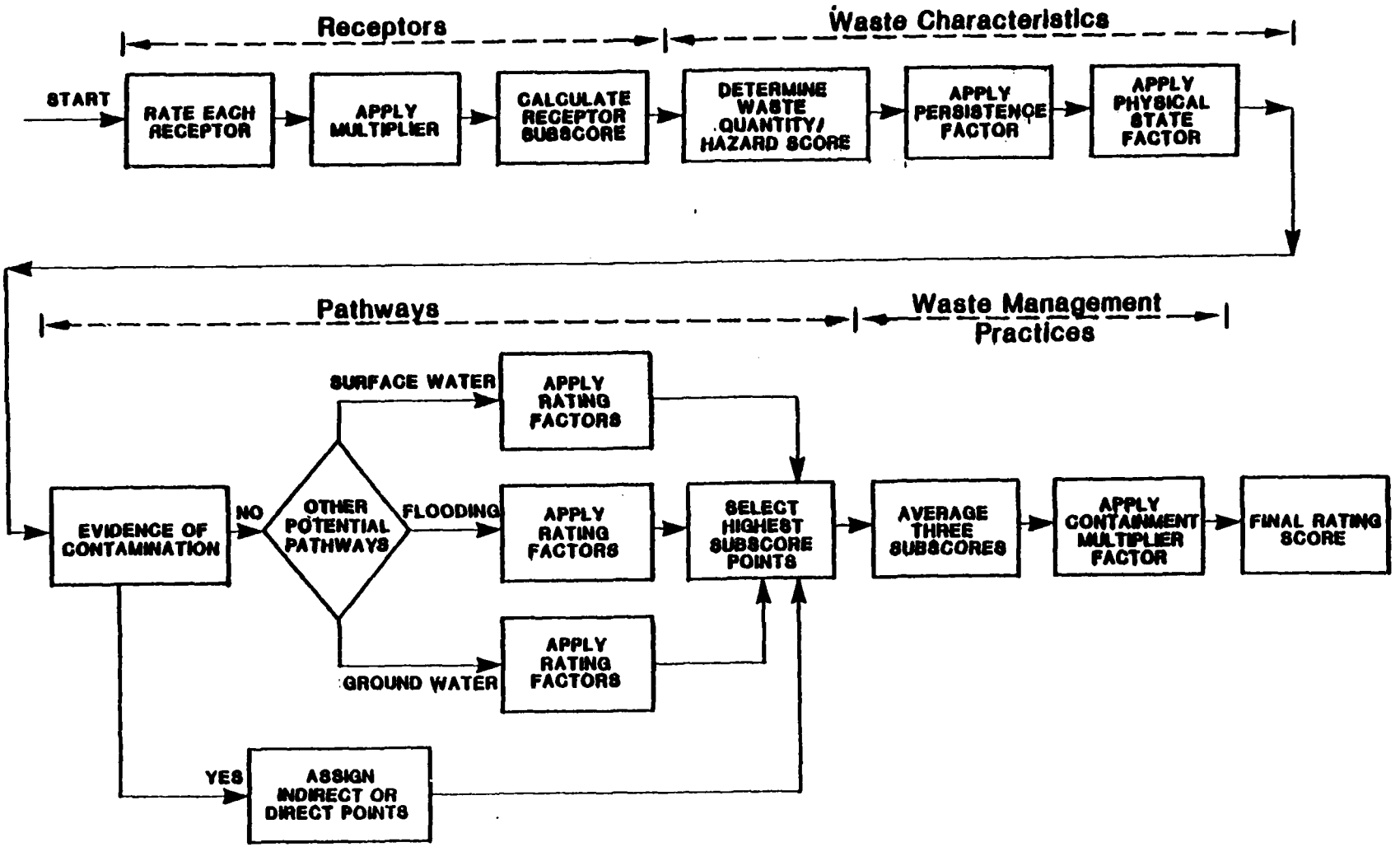

FIGURE 1

FIGURE 2

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE _____

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	_____	_____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) _____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____
2. Confidence level (C = confirmed, S = suspected) _____
3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix) _____

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	_____	_____

Subscore (100 X factor score subtotal/maximum score subtotal) _____

2. Flooding | | 1 | | |

Subscore (100 x factor score/3) _____

3. Ground-water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	_____	_____

Subscore (100 x factor score subtotal/maximum score subtotal) _____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore _____

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors _____
Waste Characteristics _____
Pathways _____

Total _____ divided by 3 = _____
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = [ ]

TABLE 1

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	3
D. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, industrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1 - 50	51 - 1,000	Greater than 1, 000	6

TABLE 1 (Continued)

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES (Cont'd)

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

Hazard Category	Rating Scale Levels			
	0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

TABLE 1 (Continued)

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES (Cont'd)

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
- o Confirmed confidence levels (C) can be added
- o Suspected confidence levels (S) can be added
- o Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating
- o Wastes with the same hazard rating can be added
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCM = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

TABLE 1 (Continued)

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES (Cont'd)

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-4} to 10^{-6} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8
B-2 POTENTIAL FOR FLOODING					
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1
B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION					
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence fissures,	No evidence of risk	Low risk	Moderate risk	High risk	8

TABLE 1 (Continued)

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES (Cont'd)

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Proection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

Appendix M
NEW SITE RATING FORMS

Table 1
SUMMARY OF RESULTS OF SITE ASSESSMENTS

Site No.	Site Description	Subscores (% of Maximum Possible Score in Each Category)			Overall Score (Sum of Subscores/3)
		Receptors	Pathways	Waste Characteristics	
4	S.E. Runway Extension Burial Site	37	69	40	49
5	"6000" Area Landfill	40	69	40	50
6	Sewage Plant Vicinity Landfill	40	80	60	60
7	Spray Field Vicinity Landfill	40	93	60	64
14	POL Area "A" Fuels Storage	43	69	60	57
15	POL Area "B" Fuels Storage	33	51	45	43
16	"Shell Bank" Fire Department Training Area	43	60	80	61
17	Highway 98 Fire Department Training Area	31	60	60	50
--	Lynn Haven Defense Fuel Support Point	47	69	60	59

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: No. 4, S.E. Runway Extension Burial Site

LOCATION: Tyndall AFB

DATE OF OPERATION OR OCCURRENCE: 1945 to 1965 (intermittently)

OWNER/OPERATOR: Tyndall AFB

COMMENTS/DESCRIPTION: Disposal of used containers, drums, and old parts

SITE RATED BY: G. McIntyre

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	0	3	0	9
D.	Distance to reservation boundary	1	6	6	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	2	6	12	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	66	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 37

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S

2. Confidence level (C = confirmed, S = suspected) S

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	0	8	0	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	22	108
Subscore (100 x factor score subtotal/maximum score subtotal)				20
2. Flooding	30	1	30	100
		Subscore (100 x factor score/3)		30
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to ground water	N/A	8	--	--
		Subtotals	62	90
Subscore (100 x factor score subtotal/maximum score subtotal)				69
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		69

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	37
Waste Characteristics	40
Pathways	69
Total 146 divided by 3 =	49
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

49 x 1.0 = 49

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: No. 5, "6000" Area Landfill

LOCATION: Tyndall AFB

DATE OF OPERATION OR OCCURRENCE: 1945 to 1965 (intermittently)

OWNER/OPERATOR: Tyndall AFB

COMMENTS/DESCRIPTION: Disposal of used containers and old parts

SITE RATED BY: G. McIntyre

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	0	3	0	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	2	6	12	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	72	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 40

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	0	8	0	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	22	108
Subscore (100 x factor score subtotal/maximum score subtotal)				20
2. Flooding	30	1	30	100
		Subscore (100 x factor score/3)		30
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to ground water	N/A	8	--	--
		Subtotals	62	90
Subscore (100 x factor score subtotal/maximum score subtotal)				69
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
			Pathways Subscore	69

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	40
Waste Characteristics	40
Pathways	69
Total 149 divided by 3 =	50
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

50 x 1.0 = 50

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: No. 6, Sewage Plant Vicinity Landfill

LOCATION: Tyndall AFB

DATE OF OPERATION OR OCCURRENCE: 1965 to 1973

OWNER/OPERATOR: Tyndall AFB

COMMENTS/DESCRIPTION: Main sanitary landfill, may have received waste oils and solvents

SITE RATED BY: G. McIntyre

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	0	3	0	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	72	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 40

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	80
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	46	108
Subscore (100 x factor score subtotal/maximum score subtotal)				43
2. Flooding	30	1	30	100
		Subscore (100 x factor score/3)		30
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	3	8	24	24
Subsurface flows	2	8	16	24
Direct access to ground water	N/A	8	--	--
		Subtotals	70	90
Subscore (100 x factor score subtotal/maximum score subtotal)				78
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	40
Waste Characteristics	60
Pathways	80
Total 180 divided by 3 =	60
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

60 x 1.0 = 60

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = [ ]

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: No. 7, Spray Field Vicinity Landfill

LOCATION: Tyndall AFB

DATE OF OPERATION OR OCCURRENCE: 1973 to 1977

OWNER/OPERATOR: Tyndall AFB

COMMENTS/DESCRIPTION: Main sanitary landfill, may have received waste oils and solvents

SITE RATED BY: G. McIntyre

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	0	3	0	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	72	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 40

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	80
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation (spray field)	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	52	108
Subscore (100 x factor score subtotal/maximum score subtotal)				48
2. Flooding	30	1	30	100
		Subscore (100 x factor score/3)		30
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation (spray field)	2	6	12	18
Soil permeability	3	8	24	24
Subsurface flows	3	8	24	24
Direct access to ground water	N/A	8	--	--
		Subtotals	84	90
Subscore (100 x factor score subtotal/maximum score subtotal)				93
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		93

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	40
Waste Characteristics	60
Pathways	93
Total 193 divided by 3 =	64
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

64 x 1.0 = 64

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: No. 14, POL Area "A" Fuels Storage

LOCATION: Tyndall AFB

DATE OF OPERATION OR OCCURRENCE: 1941 to present

OWNER/OPERATOR: Tyndall AFB

COMMENTS/DESCRIPTION: Disposal of leaded AVGAS sludge

SITE RATED BY: G. McIntyre

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	0	3	0	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	2	6	12	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	78	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 43

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 0.75 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	46	108
Subscore (100 x factor score subtotal/maximum score subtotal)				43
2. Flooding	30	1	30	100
		Subscore (100 x factor score/3)		30
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to ground water	N/A	8	--	--
		Subtotals	62	90
Subscore (100 x factor score subtotal/maximum score subtotal)				69
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		69

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	43
Waste Characteristics	60
Pathways	69
Total 172 divided by 3 =	57
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

57 x 1.0 = 57

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: No. 15, POL Area "B" Fuels Storage

LOCATION: Tyndall AFB

DATE OF OPERATION OR OCCURRENCE: 1941 to present

OWNER/OPERATOR: Tyndall AFB

COMMENTS/DESCRIPTION: Disposal of leaded AVGAS sludge

SITE RATED BY: G. McIntyre

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	0	3	0	9
D.	Distance to reservation boundary	1	6	6	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	60	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 33

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x .1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 0.75 = 45

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	1	8	8	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	30	108
Subscore (100 x factor score subtotal/maximum score subtotal)				28
2. Flooding	30	1	30	100
		Subscore (100 x factor score/3)		30
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	--	--
		Subtotals	46	90
Subscore (100 x factor score subtotal/maximum score subtotal)				51
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		51

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	33
Waste Characteristics	45
Pathways	51
Total 129 divided by 3 =	43
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

43 x 1.0 = 43

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: No. 16, "Shell Bank" Fire Department Training Area

LOCATION: Tyndall AFB

DATE OF OPERATION OR OCCURRENCE: 1943-1952, 1968-1980

OWNER/OPERATOR: Tyndall AFB

COMMENTS/DESCRIPTION: Site used for fire department training exercises

SITE RATED BY: C. McIntyre

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	0	3	0	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	2	6	12	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	78	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 43

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	46	108
Subscore (100 x factor score subtotal/maximum score subtotal)				43
2. Flooding	30	1	30	100
		Subscore (100 x factor score/3)		30
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	--	--
		Subtotals	54	90
Subscore (100 x factor score subtotal/maximum score subtotal)				60
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		60

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	43
Waste Characteristics	80
Pathways	60
Total 183 divided by 3 =	61
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

61 x 1.0 = 61

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: No. 17, Highway 98 Fire Department Training Area

LOCATION: Tyndall AFB

DATE OF OPERATION OR OCCURRENCE: 1952-1958

OWNER/OPERATOR: Tyndall AFB

COMMENTS/DESCRIPTION: Site sued for fire department training exercises

SITE RATED BY: G. McIntyre

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	0	3	0	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	56	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 31

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	46	108
Subscore (100 x factor score subtotal/maximum score subtotal)				43
2. Flooding	30	1	30	100
		Subscore (100 x factor score/3)		30
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	--	--
		Subtotals	54	90
Subscore (100 x factor score subtotal/maximum score subtotal)				60
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		60

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	31
Waste Characteristics	60
Pathways	60
Total 151 divided by 3 =	50
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

50 x 1.0 = 50

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Lynn Haven Defense Fuel Support Point

LOCATION: Lynn Haven DFSP

DATE OF OPERATION OR OCCURRENCE: 1940 to present

OWNER/OPERATOR: Lynn Haven DFSP

COMMENTS/DESCRIPTION: Disposal of leaded AVGAS sludge, Bunker C fuel disposal

SITE RATED BY: G. McIntyre

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	2	3	6	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	2	6	12	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	84	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 47

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 0.75 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	46	108
Subscore (100 x factor score subtotal/maximum score subtotal)				43
2. Flooding	30	1	30	100
		Subscore (100 x factor score/3)		30
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to ground water	N/A	8	--	--
		Subtotals	62	90
Subscore (100 x factor score subtotal/maximum score subtotal)				69
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		69

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	47
Waste Characteristics	60
Pathways	69
Total 176 divided by 3 =	59
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

59 x 1.0 = 59